



Edrolo

VCE PSYCHOLOGY

Units 3 & 4



2ND EDITION



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PUBLISHED IN AUSTRALIA BY Edrolo
321 Exhibition Street Melbourne VIC 3000, Australia

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Ref: 3.2.1

First published 2022

2nd Edition (revised) published 2023

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National Library of Australia Cataloguing-in-Publication data

TITLE: Edrolo VCE Psychology Units 3 & 4

CREATOR: Edrolo et al.

ISBN: 978-1-922901-27-9

TARGET AUDIENCE: For secondary school age.

SUBJECTS: Psychology--Study and teaching (Secondary)--Victoria

Psychology--Victoria--Textbooks

Psychology--Theory, exercises, etc.

OTHER CREATORS/CONTRIBUTORS: Andrew Peters, Jacinta Walsh, Christine Lovell, Tania Vranes, Samuel Crocket, Lucie Young, Annele Cook, Janette Tang

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Printed in Australia by Ligare Printing Pty Ltd

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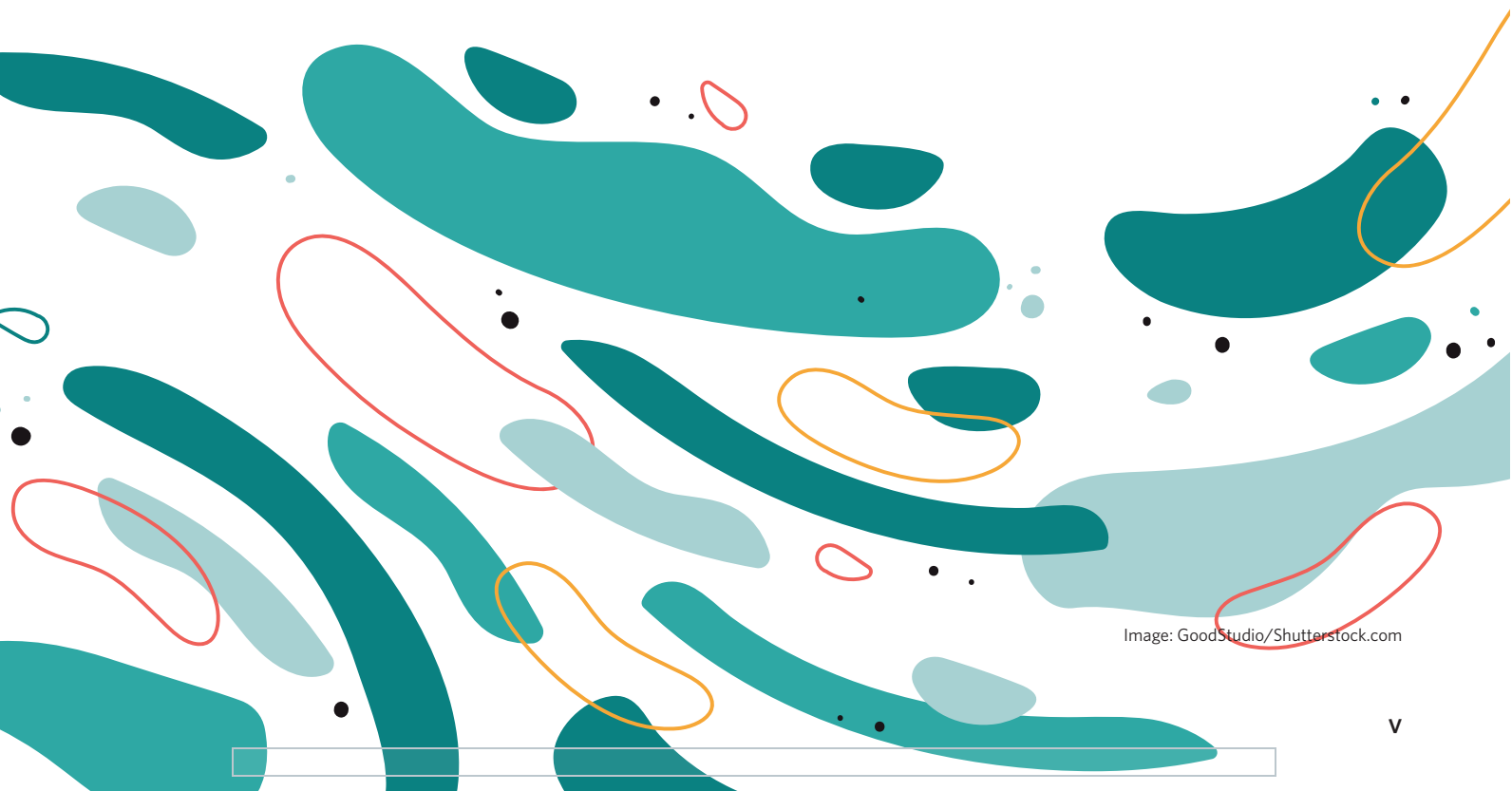
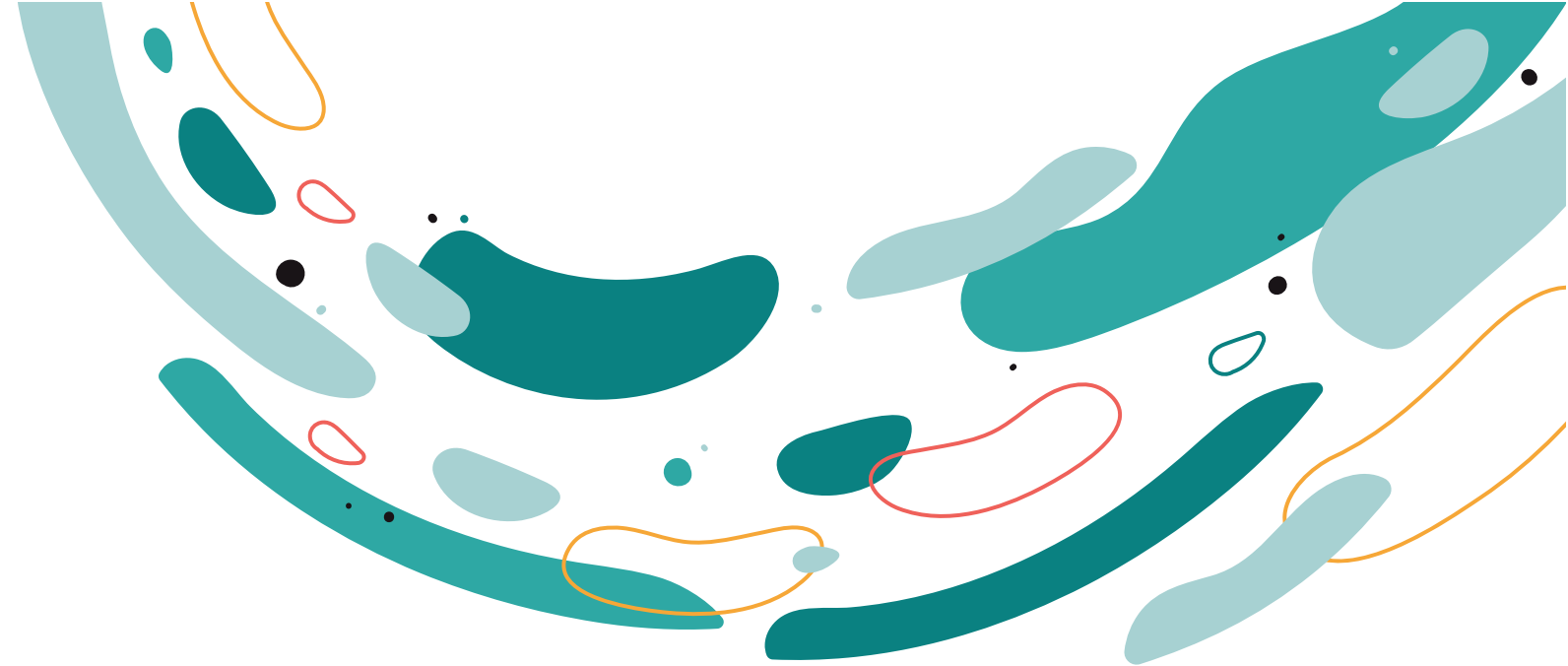


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FEATURES OF THIS BOOK

Edrolo's VCE Psychology Units 3 & 4 textbook has the following features.

Theory

Study design dot points provide explicit links between the content covered in each lesson and the VCAA curriculum.

Hooks introduce the content of the lesson in an approachable way.

Explore boxes include useful tips, lesson links, want to know more, and psychology exploration boxes.

Key knowledge units break down the theory into smaller chunks that correspond with the relevant theory lesson videos on the Edrolo online platform.

Activities are provided on the Edrolo online platform and allow engagement and further understanding of the content covered in each lesson.

5B Brain structures involved in memory

STUDY DESIGN DOT POINT
The role of the hippocampus, amygdala, neocortex, basal ganglia and cerebellum in long-term implicit and explicit memory.

Types of long-term memory

Explicit memory

Implicit memory

Explicit memory (EM) is a type of long-term memory that is consciously recalled. These memories can be voluntarily retrieved from long-term memory and brought into conscious awareness. Explicit memories are also known as declarative memories because they can be declared or reported to someone else. They can include any information that you can verbally report, such as the date of your birthday or the name of your favourite actor.

Implicit memory (IM) is a type of long-term memory that is unconsciously recalled. These memories are not voluntarily retrieved from long-term memory and are not brought into conscious awareness. Implicit memories are also known as non-declarative memories because they cannot be verbally reported to someone else. They can include any information that you cannot verbally report, such as your ability to ride a bicycle or your preference for a certain type of food.

Explicit memory (EM)

| Type of explicit memory | What is it? | Examples |
|-------------------------------|---|---|
| Semantic memory (EM.1) | • Semantic memory is a type of explicit memory that consists of general knowledge or facts. | • Knowing that • there are seven continents • dogs bark, which can cause • their wagging by their • tail. |
| Episodic memory (EM.2) | • Episodic memory is a type of explicit memory that consists of personal experiences or events. | • The memory of • getting your driver's licence • getting your hair done • on holiday • when you are about ten feet high. |

Implicit memory (IM)

| Type of implicit memory | What is it? | Examples |
|--|--|---|
| Procedural memory (IM.1) | • Procedural memory is a type of implicit memory that consists of general knowledge or facts. | • Knowing how to • ride a bicycle • drive a car • play a musical instrument. |
| Classically conditioned memory (IM.2) | • Classically conditioned memory is a type of implicit memory that consists of personal experiences or events. | • The memory of • getting your driver's licence • getting your hair done • on holiday • when you are about ten feet high. |

Questions

Theory review questions test if students can remember the foundational concepts and overcome common misconceptions.

Assessment skills
Compare and evaluate
The following assessment skills types:
• comparison and evaluation of
• three student prac activities

Assessment skill questions develop the skills students need for SACs and other assessments.

Exam-style questions reflect the style of questions presented in the end-of-year exam in Year 12.

5B Questions

Theory review

Question 1
Long-term memory involves only one type of memory.
A. True
B. False

Question 2
Explicit memory is also known as:
A. non-declarative memory
B. declarative memory
C. conscious memory

Question 3
Which memory consists of _____ and _____ memory?
A. episodic, semantic
B. episodic, procedural
C. episodic, classical
D. episodic, classical

Question 4
Which of the following statements best reflects how the removal of the hippocampus impacted H.M.'s memory?
A. "H.M. is able to form new explicit memories but is unable to retrieve any of the information he has learned."
B. "H.M. remembers events from his childhood and some familiar events that occurred before his surgery."
C. "H.M. is unable to form any new long-term memories while he is able to form new explicit memories."
D. "H.M. is able to form new explicit memories but is unable to retrieve any of the information he has learned."

Question 5
Which of the following statements best reflects how L.P.'s memory was affected by the attack of encephalitis?
A. "L.P. found it difficult recognizing familiar faces, remembering the meaning of words, recalling facts about famous people, and finding items in her familiar grocery store."
B. "She was still able to form new explicit memories and complete tasks, such as sewing and driving."
C. "L.P.'s semantic memory was impaired following the attack of encephalitis. Which of the following statements best describes how L.P.'s memory was affected by the attack of encephalitis?
A. L.P. may have experienced damage to her hippocampus as her semantic memory was impaired.
B. L.P. may have experienced damage to her cerebellum as her semantic memory was impaired.
C. L.P. may have experienced damage to her basal ganglia as her semantic memory was impaired.
D. L.P. may have experienced damage to her brain stem as her semantic memory was impaired."

Question 6
H.M. was unable to form any new long-term memories while L.P. was able to form new explicit memories. This difference suggests that:
A. L.P. experienced damage to her hippocampus.
B. L.P. experienced damage to her neocortex.
C. L.P. did not experience damage to her hippocampus.
D. L.P. did not experience damage to her neocortex."

Question 7
L.P. was able to complete tasks, such as sewing and driving. It is likely that H.M. was able to complete the same tasks?
A. True
B. False

Question 8
H.M. was likely unable to complete the same tasks as his hippocampus was removed, which is the area of the brain responsible for encoding and storing procedural memories.
A. True
B. False

Question 9
H.M. was likely able to complete the same tasks as his cerebellum was not removed, which is the area of the brain responsible for encoding and storing procedural memories.
A. True
B. False

Exam-style

Question 10
Which type of long-term memory involves knowing that the date is 19th? The English alphabet has 26 letters.
A. Episodic memory
B. Semantic memory
C. Procedural memory
D. Sensory memory

Exemplar responses are provided for every exam-style question to demonstrate what a full mark response could look like.

Online video solutions provide immediate feedback and extra guidance on how to answer questions.

- ✓ I have identified one ethical issue that was breached.*
- ✓ I have justified why the ethical issue was breached.*
- ✓ I have identified another ethical issue that was breached.*
- ✓ I have justified why the ethical issue was breached.*

Checklists break down exam-style questions to highlight what is required to earn full marks.

5B Brain structures involved in memory

Theory review

1. Explain the difference between explicit memory and implicit memory. (2 marks)

2. Explain the difference between explicit memory and implicit memory. (2 marks)

3. Explain the difference between explicit memory and implicit memory. (2 marks)

4. Explain the difference between explicit memory and implicit memory. (2 marks)

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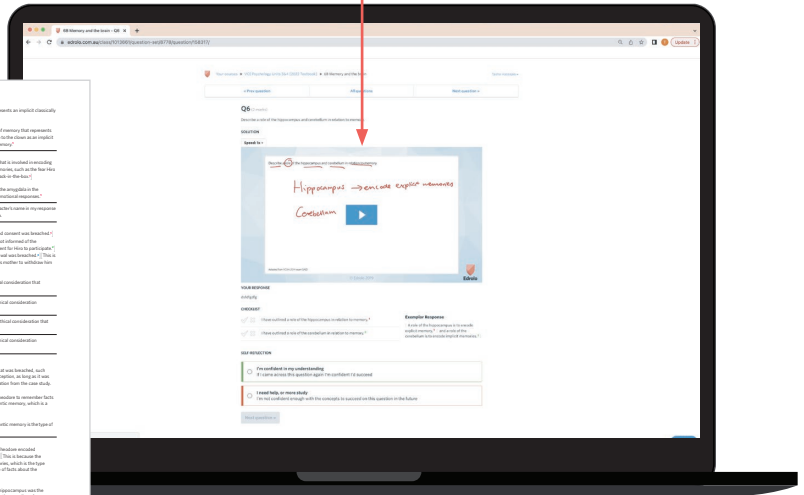
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99. Explain the difference between explicit memory and implicit memory. (2 marks)

100. Explain the difference between explicit memory and implicit memory. (2 marks)



Hints are provided for each theory review question to help students understand the answer in greater detail.

Chapter summaries are an outline of the knowledge from the entire chapter.

Chapter review activities help to revise and develop students' understanding of content throughout the whole chapter.

Chapter 5 review

Chapter summary

This chapter is all about the psychological process of memory. You learn that memory is a complex concept involving several processes: encoding, storage, and retrieval.

In Section 5A, you learn about the main types of memory: sensory, short-term, and long-term memory.

In Section 5B, you learn about the brain structures involved in memory: the hippocampus, amygdala, and cerebellum.

In Section 5C, you learn about the different types of long-term memory: explicit and implicit memory.

1A Memory systems and processes involved in the memory system

1B Memory systems and processes involved in the memory system

1C Memory systems and processes involved in the memory system

1D Memory systems and processes involved in the memory system

2 CHAPTER 5: THE PSYCHOLOGICAL PROCESS OF MEMORY

Chapter review activities

Review activity 1: Create your own mnemonics

In this chapter, you have learnt about mnemonics as strategies that aid the encoding, storage, and retrieval of information. For example, the phrase 'Memory Needs Every Student Of Learning To Capacity' can be used to help you remember the coding and function of mnemonic devices. Try to come up with your own ways to remember the concepts covered in this chapter using mnemonic devices.

| Things to learn this semester: | Your mnemonic: |
|---|----------------|
| 1. Memory systems and processes involved in the memory system | |
| 2. Memory systems and processes involved in the memory system | |
| 3. Memory systems and processes involved in the memory system | |
| 4. Memory systems and processes involved in the memory system | |
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Chapter 5 test

Multiple choice

Question 1 (1 mark)

Information that is not consolidated is

A. cannot be recalled by the amygdala.

B. will not move to short-term memory and into conscious awareness.

C. will be stored in long-term memory.

D. will not move to short-term memory and into unconscious awareness.

Question 2 (1 mark)

Bobby was asked to produce a free response to his public feedback. The type of memory this free response represents is

A. explicit memory and the cerebellum, respectively.

B. procedural memory and the hippocampus, respectively.

C. implicit memory and the amygdala, respectively.

D. explicit memory and the cerebellum, respectively.

Question 3 (1 mark)

Which of the following is an important component of both the method of loci and Spangler mnemonic devices?

A. Visual imagery and rhythm.

B. Visual images.

C. Hearing music.

The chapter test includes exam-style questions from content throughout the chapter to help students revise and reinforce content.

Area of study reviews are written based on the assessment types provided by VCAA and act as a practice SAC, with each SAC worth 40 marks.

Unit 3 AOS 2 review

The VCE study design outlines that, upon completion of this area of study, you must be able to 'apply different approaches to explore learning to familiar and novel contexts and discuss memory as a psychological process.'

SAC assessment 1

This following task can be used as a practice SAC. This task is based on the following study design assessment type: application and evaluation of psychological concepts, methodologies and methods, and design from these student product activities.

Refer to the following linkback activities to answer the questions in this practice SAC.

Activity 1: Classical conditioning

Aim
To investigate the process of learning through classical conditioning.

Materials

- Bell
- Mince Pie (or any food item)
- Spoon
- Timer
- 3 different alarm tones

Method

1. In a group of three, assign the following roles:
- experimenter
- participant
- observer

2. The experimenter and participant sit opposite to each other, with the observer sitting next to the experimenter with a clear view of the participant.

3. Prior to trials, the experimenter rings the bell several times without presenting any Mince Pie.

4. In trial 1, the experimenter rings the bell five and then the participant takes a quantity of Mince Pie within 15 seconds. **Note:** The trials should be done at regular intervals within a time period of 30 seconds.

5. In trial 2, the experimenter rings the bell but the participant does not take a quantity of Mince Pie. Participant needs to indicate if satiation occurs.

6. Repeat steps and repeat.

Results
Record how many times each participant satiated in trials 1 to 25, when the bell was sounded without the presentation of Mince Pie.





CHAPTER 1

Key science skills

LESSONS

- 1A** Introduction to research
- 1B** Scientific research methodologies
- 1C** Population, sample and sampling
- 1D** Preventing error and bias
- 1E** Organising and interpreting data
- 1F** Evaluating research
- 1G** Ethical considerations

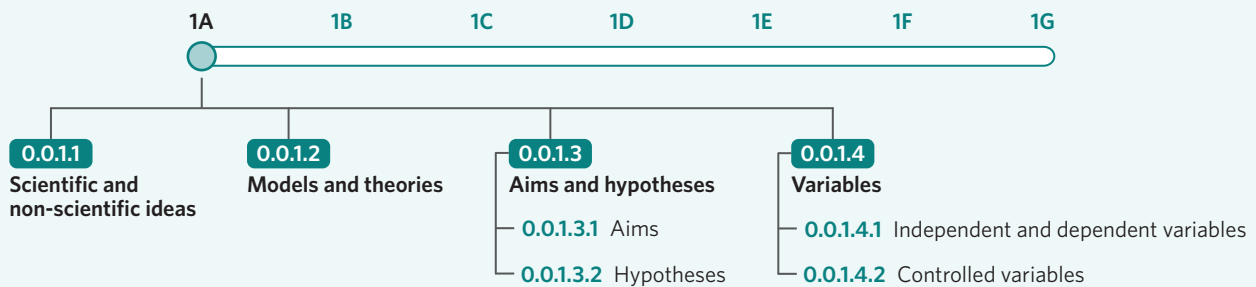
KEY SCIENCE SKILLS

- Develop aims and questions, formulate hypotheses and make predictions
- Plan and conduct investigations
- Comply with safety and ethical guidelines
- Generate, collate and record data
- Analyse and evaluate data and investigation methods
- Construct evidence-based arguments and draw conclusions
- Analyse, evaluate and communicate scientific ideas

1A Introduction to research

KEY SCIENCE SKILLS

- Construct evidence-based arguments and draw conclusions
- Analyse, evaluate and communicate scientific ideas
- Develop aims and questions, formulate hypotheses and make predictions



Astrology, phrenology, and palm reading: what do these three things have in common? They are all non-scientific approaches to understanding or making predictions about human behaviour and the mind. Psychology, on the other hand, is the scientific study of human behaviour and mental states. This means that it uses the knowledge and methods of science to understand and make predictions, as well as form theories and make models about human behaviour and mental states. Throughout this chapter, you will learn all about how the field of psychology conducts this kind of scientific research. In this lesson, you will learn about why psychology is considered a science, as well as some of the very fundamentals of psychological research.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Scientific and non-scientific ideas 0.0.1.1

We can categorise all ideas in the world into two buckets: scientific and non-scientific ideas. In this section of the lesson, we will look at what classifies something as science versus non-science.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Construct evidence-based arguments and draw conclusions
 - distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas

KEY TERMS

Psychology the scientific study of human mental states and behaviour

Science a field and practice that obtains knowledge and generates theories through observation and experiment

Theory details

Psychology is defined as the scientific study of human mental states and behaviour. **Science** is a field and practice that obtains knowledge and generates theories through observation and experiment. But what makes psychology a science and how can we be sure it is one? Defining what science is can be a very tricky thing to do: scientists, philosophers, historians – pretty much all experts that attempt to answer this question – still debate what truly defines ‘science’.

WANT TO KNOW MORE?

In the philosophy of science, the major and ongoing question of defining ‘science’ versus ‘non-science’ is referred to as the ‘demarcation problem’. ‘Demarcate’ means to distinguish or decide on the clear boundaries of something.

To understand what scientific ideas are for our purposes, we can consider some hallmark features of science. Such features include that science relies on and produces **empirical evidence** (information obtained through direct and systematic observation or experimentation). Furthermore, science aims to be an objective, self-correcting field that produces explanatory claims that are provisional (updatable at a later time), testable, and reliable. Science also employs systematic methodologies, such as experimentation, observation, and hypothesis-testing. Finally, the findings of scientific research tend to contribute to ‘public knowledge’ and are often open to processes of ‘peer review’ (in which claims are reviewed by other individuals in the scientific field, such as researchers).

So if these are features of ‘science’, what makes something ‘non-science’? **Non-science** refers to ideas formed without empirical evidence or the use of scientific methods or principles. It includes **pseudoscience** (beliefs, theories, and practices that are mistakenly regarded as, or claim to be scientific, but are not because they do not use the methods of science) and may also be understood through a set of features. Non-science makes claims that cannot be verified through observation or evidence. In other words, it can’t be proven wrong. For example, astrology might claim that ‘today is a good day to believe in yourself’; how do you disprove this with evidence? It also tends not to engage with criticism, nor contribute to a body of public, verifiable knowledge. Non-science often commits logical fallacies (‘wrong’ or invalid steps of reasoning), such as asserting conclusions with weak or false premises. For example, it may start with conclusions and then ‘cherry-pick’ evidence that support them, while ignoring non-supporting, empirical evidence.

Empirical evidence information obtained through direct and systematic observation or experimentation

Non-science ideas formed without empirical evidence or the use of scientific methods or principles

Pseudoscience beliefs, theories, and practices that are mistakenly regarded as, or claim to be scientific, but are not because they do not use the methods of science

Table 1 Summary of the distinguishing features of scientific versus non-scientific ideas

| Features | |
|----------------------|--|
| Scientific ideas | <p>Scientific ideas generally:</p> <ul style="list-style-type: none"> • aim to be objective • utilise and produce empirical evidence • are formed using the methods of science • use predictions, models, and theories that are provisional and verifiable to explain reality. |
| Non-scientific ideas | <p>Non-scientific ideas may be:</p> <ul style="list-style-type: none"> • non-objective • unempirical • imprecise or vague • dogmatic (not open to questioning) • unverifiable. <p>Non-scientific ideas may be formed on the basis of:</p> <ul style="list-style-type: none"> • anecdote (stories based on personal experience) • opinion (the view or perspective of someone not necessarily based on evidence) • intuition (something that one feels instinctively as opposed to arrives at through considered reasoning) • hearsay (rumour or information from others which cannot be supported with evidence). |

WANT TO KNOW MORE?

The following are some common examples of pseudoscientific approaches to explaining human mental processes and behaviours:

- astrology
- numerology
- phrenology.

Because they are non-scientific, even though they make claims about the human mind or behaviour, they are not considered to be a part of the field of psychology.

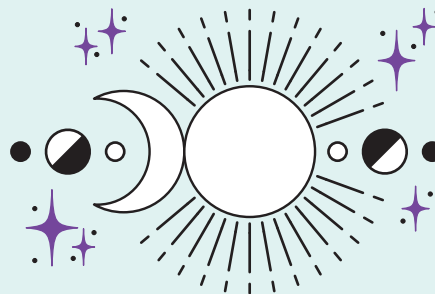


Figure 1 Astrology is pseudoscience because it makes vague, unverifiable, and imprecise claims

The scientific method
 a procedure used to obtain knowledge that involves hypothesis formulation, testing, and retesting through processes of experimentation, observation, measurement, and recording

The scientific method

As we have just learnt, a major component of what characterises ‘science’ is the methods used to obtain knowledge. Psychology and other sciences often use a specific procedure for gaining knowledge known as the scientific method. While it is not the only method used to obtain scientific knowledge in psychology or other sciences, it is a commonly used approach that underlies rigorous research across the sciences, especially experimentation.

So what is the scientific method? **The scientific method** is a procedure used to obtain knowledge that involves hypothesis formulation, testing, and re-testing through processes of experimentation, observation, measurement, and recording. Importantly, it is centred around generating an informed hypothesis (a prediction) and then testing it to generate evidence that either supports or refutes it. You will soon see that understanding the scientific method and the idea of hypothesis-testing is very important to your studies in VCE Psychology.

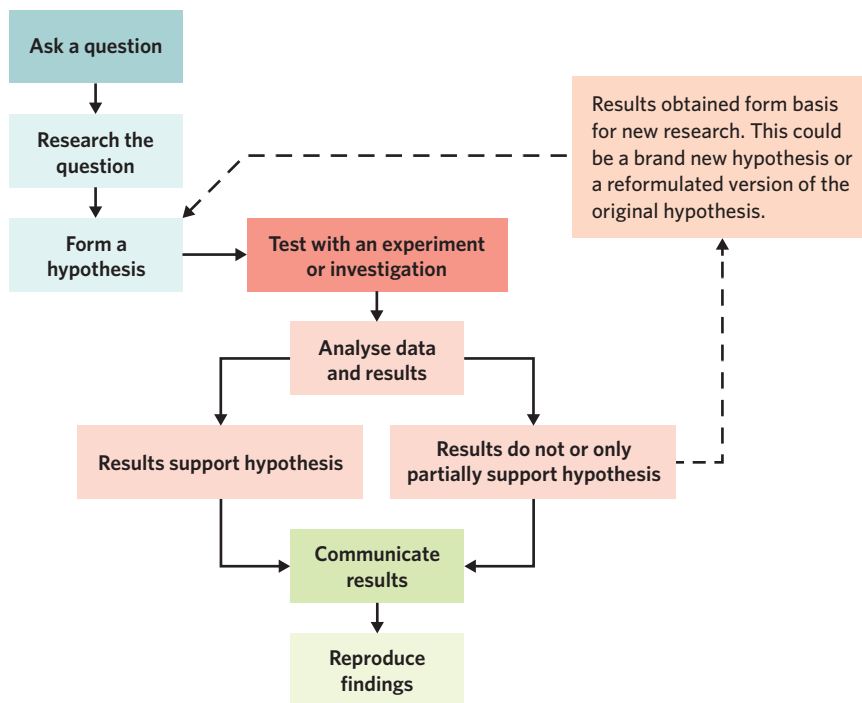


Figure 2 The scientific method

USEFUL TIP

The scientific method is often thought of as a cyclical process due to it being ongoing and evolving in response to emerging research. For example, an individual may create a research hypothesis in response to examining a psychological theory. After conducting research to see if this hypothesis has previously been tested, they may conduct an experiment and observe the findings. These findings may challenge or support the theory that inspired their research. This process goes on and on over time, as the whole process may repeat when another individual becomes aware of the findings of the study just conducted. This process is outlined in figure 3.

```

    graph TD
      Theory[Theory] -- "Use the theory to form a hypothesis" --> Hypothesis[Hypothesis]
      Hypothesis -- "Design a study to test the hypothesis" --> Research[Research]
      Research -- "Perform the research" --> Conclusion[Conclusion]
      Conclusion -- "Create or modify the theory" --> Theory
    
```

Figure 3 The cyclical nature of the scientific method

Models and theories 0.0.1.2

How do we organise all of the scientific knowledge that has accumulated over time? Models and theories are one way in which we can organise and understand observations and concepts related to psychology.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Analyse, evaluate and communicate scientific ideas
 - analyse and explain how models and theories are used to organise and understand observed phenomena and concepts related to psychology, identifying limitations of selected models/theories

Theory details

As a result of scientific research, we are able to generate models and theories that explain the world around us. Both of these things equip us, as scientific thinkers, with a common language that we can use to communicate with each other about the world and also to devise informed solutions to our problems.

Table 2 The difference between scientific models and scientific theories

| | Theory | Model |
|------------------------------|---|--|
| Definition | A theory is a proposition or set of principles that is used to explain something or make predictions about cause and effect. | A model is a representation of a concept, process, or behaviour, often made to simplify or make something easier to understand. |
| Main function | Explain and predict | Simplify and represent |
| Informed by | Scientific research or logic | Scientific theories and ideas |
| Example in psychology | Behaviourism; i.e., the theory that behaviour is learnt through interaction with the environment. | The multi-store model of memory posits that we have a sensory, short-term, and a long-term memory 'store'. |

Theory a proposition or set of principles that is used to explain something or make predictions about relationships between concepts

Model a representation of a concept, process, or behaviour, often made to simplify or make something easier to understand

Psychological models and theories explain psychological phenomena. For example, the idea of having short-term memory and long-term memory 'stores' is a psychological model that helps to simplify our description of processes of the human mind. Having this conceptual model provides us with a useful way to talk about memory and address problems of memory, but it is only one way of representing this idea. It is important to note that there may be alternative scientific models and theories that are also valid.

Aims and hypotheses 0.0.1.3

Whenever researchers want to conduct an investigation in psychology, they first create an aim and at least one hypothesis. This is what allows researchers to ensure that their study follows the scientific method.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Develop aims and questions, formulate hypotheses and make predictions
 - identify, research and construct aims and questions for investigation
 - formulate hypotheses to focus investigations
 - predict possible outcomes of investigations

Theory details

Imagine you are a researcher wanting to conduct a study on the role of sleep on mental health. That's a big topic, and one investigation can only cover so much. Think about it: how much sleep are we talking about? What aspects of sleep do you want to know about? And what exactly about mental health? Do you want to know sleep's effect on a specific mental health problem, or for a certain age group's mental health? There are so many possibilities.

Before beginning any psychological study, researchers must narrow the scope of what is to be investigated. To do this, researchers form a research question or problem. This helps them to have a clear objective for their investigation and also informs what kinds of methods and procedures they will use. Before beginning any research, on the basis of their research question, a researcher must also outline a study's:

- aim
- hypothesis or hypotheses (a study may have more than one).

Aims 0.0.1.3.1

In psychological research, an **aim** is a statement outlining the purpose of the investigation.

It should be written as a succinct and straightforward sentence that clearly helps to narrow the parameters of the investigation. For example, a study on the role of sleep in mental health might have the following aims:

- The aim of this investigation is to explore the relationship between partial sleep deprivation and low mood.
- The aim of this study is to investigate the role of high quality sleep on concentration.

Hypotheses 0.0.1.3.2

In line with an investigation's aim and on the basis of scientific knowledge or experience, researchers must also form a hypothesis or hypotheses. A **hypothesis** is a testable prediction about the outcome of an investigation. Through psychological studies, researchers are trying to see if their hypothesis is supported or rejected. Remember also that this is a core function of the scientific method. This is why it is important that hypotheses are written in a way that makes them testable.

In experiments, a specific type of psychological investigation, a hypothesis often includes:

- the **variables**, which are the specific conditions or components of an experiment that can be manipulated or measured by the experimenter, such as 'test scores' or 'mood levels'. Two specific types of variables must be in an experimental hypothesis: the independent variable and the dependent variable, which we will learn about later in this lesson.
- the **population**, which is the group of people who are the focus of the research and from which the sample is drawn. Having a specific target population helps to narrow the scope of research and also improves the quality of research because certain methods and measures in research can be more suited to certain groups of people.
- a prediction about the 'direction' of results; for example, that some outcome was 'more likely' or 'less likely', or that some condition would increase or decrease.

Again, considering the example of sleep and mental health, some hypotheses could be:

- It was hypothesised that Australian females aged 12–16 who experienced partial sleep deprivation would be more likely to also experience low mood than those who did not experience partial sleep deprivation.
- It was hypothesised that high school students who had high quality sleep would perform better on tests of concentration than those who did not have high quality sleep.

Aim a statement outlining the purpose of an investigation

Hypothesis a testable prediction about the outcome of an investigation

Variable a condition or component of an experiment that can be measured or manipulated by the experimenter

Population (also known as research population) the group of people who are the focus of the research and from which the sample is drawn

USEFUL TIP

The acronym 'IPAD' can help you remember all the components which must be included in an experimental hypothesis:

- Independent variable and dependent variables
- Population and
- Direction

LESSON LINK

In lesson **1B Scientific research methodologies**, you will learn about other types of psychological investigations beyond experiments.

WANT TO KNOW MORE?

In the world of psychological research, there is another type of hypothesis called the 'null hypothesis'. This is often a version of an experiment's main hypothesis, but stated as if there is no relationship (i.e. 'null') between the independent and dependent variables. If the findings of an experiment are statistically significant (i.e. not due to chance), the null hypothesis is rejected. Having a null hypothesis allows researchers to communicate a clear conclusion, regardless of whether the primary hypothesis is supported or rejected.

Variables 0.0.1.4

In psychological experiments, researchers are investigating the relationship between variables. There are a few different types of variables with which you should be familiar.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Develop aims and questions, formulate hypotheses and make predictions
 - identify independent, dependent and controlled variables in controlled experiments

Theory details

Independent and dependent variables 0.0.1.4.1

As mentioned, psychological experiments investigate the relationship between two variables.

Controlled experiments are a type of investigation in which the causal relationship between two variables is tested in a controlled environment; more specifically, the effect of the independent variable on the dependent variable is tested while aiming to control all other variables.

In an experiment, the **independent variable (IV)** is the variable for which quantities are manipulated (controlled, selected, or changed) by the researcher, and the variable that is assumed to have a direct effect on the dependent variable. In contrast, the **dependent variable (DV)** is the variable the researcher measures in an experiment for changes it may experience due to the effect of the independent variable.

Controlled experiment

a type of investigation in which the causal relationship between two variables is tested in a controlled environment; more specifically, the effect of the independent variable on the dependent variable is tested while aiming to control all other variables

Independent variable (IV)

the variable for which quantities are manipulated (controlled, selected, or changed) by the researcher, and the variable that is assumed to have a direct effect on the dependent variable

Dependent variable (DV)

the variable the researcher measures in an experiment for changes it may experience due to the effect of the independent variable

Table 3 Examples of independent and dependent variables in experimental hypotheses

| Example hypothesis | Independent and dependent variables |
|---|--|
| It was hypothesised that Australian females aged 12–16 who experienced partial sleep deprivation were more likely to experience low mood than those who did not experience partial sleep deprivation. | <ul style="list-style-type: none"> • Independent variable: partial sleep deprivation or no partial sleep deprivation. This is because it is something that is manipulated by a researcher (e.g. total hours of sleep deprivation) to see its effect. • Dependent variable: mood levels. This is because it is what is being impacted by the IV (sleep deprivation) and is measured (e.g. through scores on a self-rated mood scale). |
| It was hypothesised that high school students who had high quality sleep would perform better on tests of concentration than those who did not have high quality sleep. | <ul style="list-style-type: none"> • Independent variable: quality of sleep. This is because it is something that is manipulated by a researcher (e.g. total hours of uninterrupted deep sleep) to see its effect. • Dependent variable: performance on tests of concentration. This is because it is what is being impacted by the IV (high quality sleep) and is measured (e.g. through test scores). |

USEFUL TIP

It is always the case that we want to see the effect of the independent variable on the dependent variable. This is also how you can remember the difference between the two: the independent variable is manipulated so we can understand its effect on the dependent variable, which is then measured.

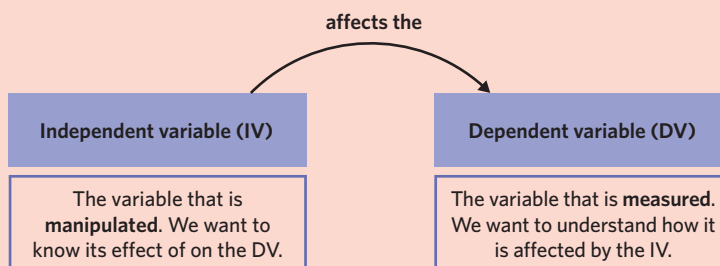


Figure 4 You can remember the difference between the independent and dependent variable through the words 'manipulation' and 'measurement'

USEFUL TIP

After data is collected during research, it will often be displayed visually. When graphs are used to plot the relationship between variables, the independent variable is presented on the horizontal axis (x-axis) and the dependent variable is presented on the vertical axis (y-axis).

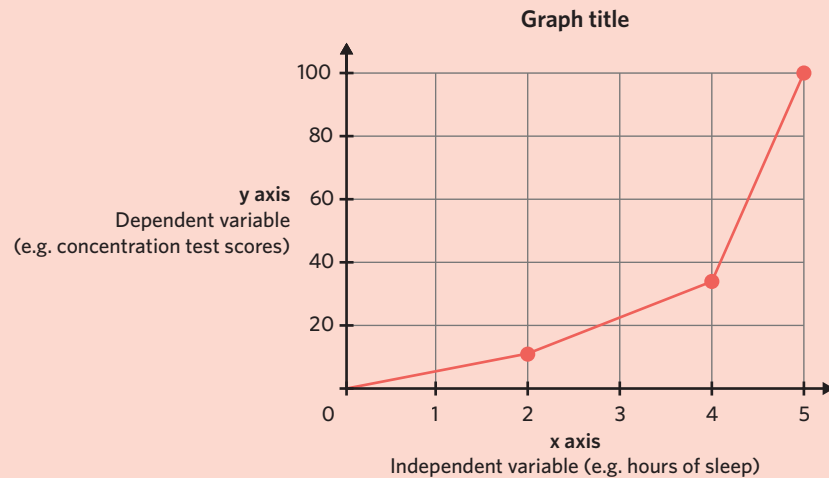


Figure 5 Sample graph showing where the independent and dependent variables would be plotted

Operationalising variables

Operationalising variables refers to specifying exactly how the variables will be manipulated or measured in a particular controlled experiment. For example, if a dependent variable is 'concentration', then this same variable operationalised might be 'concentration as shown by the number of minutes spent on an assigned task without stopping'. Similarly, if the independent variable that is manipulated to influence concentration is 'quality of sleep', this may be operationalised as 'the hours of REM, NREM, and total sleep as measured by EEG recordings'.

In psychological research, it does not matter if a hypothesis is rejected — a rejection is a valuable finding in itself. However, when designing an experiment, it is important that variables are specific enough so that a hypothesis can be clearly supported or refuted. 'Concentration' is broad and can be measured and spoken about in many different ways. So, to have a clear finding about concentration, the exact form or measurement of concentration needs to be specified. Having a clear outcome from an experiment, supported by the correct operationalisation of variables, is what best allows researchers to contribute to the current state of psychological research, and indeed, the world's understanding of psychology.

Controlled variables 0.0.1.4.2

How many different things can you think of that may affect 'concentration'? Unfortunately for researchers, there are often things that can affect the dependent variable in an experiment besides the independent variable. For example, in an experiment studying the effect of sleep deprivation on concentration, a participant's concentration may also be affected by what noise they can hear during a concentration test, whether they've consumed caffeine, and so on. When unwanted variables may have affected the dependent variable, researchers cannot always conclusively say changes in the dependent variable were due to just the independent variable. This is where controlled variables come in handy.

Controlled variables

variables other than the IV that a researcher holds constant (controls) in an investigation, to ensure that changes in the DV are solely due to changes in the IV

Controlled variables are variables other than the IV that a researcher holds constant (controls) in an investigation, to ensure that changes in the DV are solely due to changes in the IV.

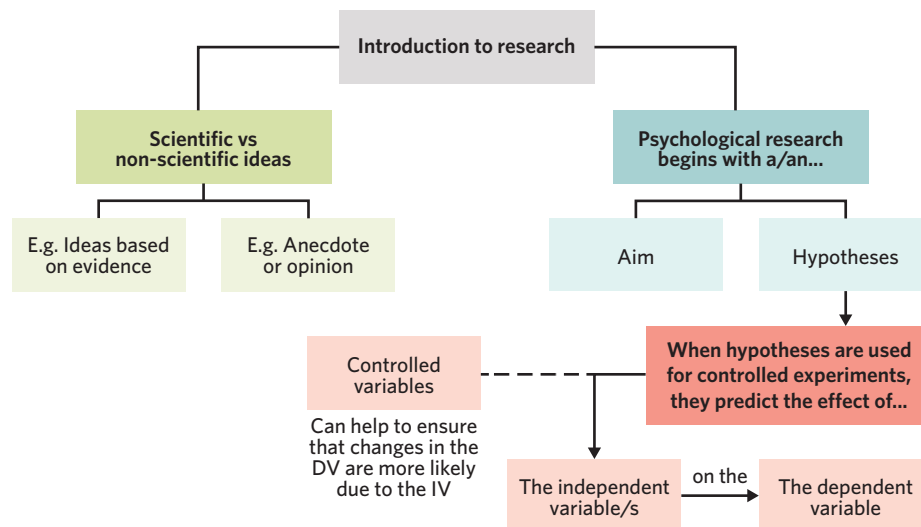
They are not part of the investigation because a controlled variable is not an experimental variable (IV or DV) (VCAA). For example, in that same study on concentration, researchers may ensure that participants all complete their test of concentration in a silent room, thereby holding the variable of 'noise levels' constant (controlled). This allows researchers to ensure that the dependent variable (concentration) was more likely affected by the independent variable (sleep deprivation) than a non-controlled, unwanted variable (noise levels). Table 4 outlines some potential variables experimenters might want to keep constant (controlled) in two example studies.

Table 4 Examples of potential controlled variables for two different experiments

| Experimental hypothesis | Potential variables experimenters might want to hold constant (i.e. make a controlled variable) |
|--|---|
| It was hypothesised that Australian females aged 12–16 who experienced partial sleep deprivation were more likely to also experience low mood than those who did not experience partial sleep deprivation. | <ul style="list-style-type: none"> • Exercise done by participants on day of mood measurement • Light levels on day of mood measurement • Food eaten by participants on day of mood measurement |
| It was hypothesised that high school students who had high quality sleep would perform better on tests of concentration than those who did not have a high quality sleep. | <ul style="list-style-type: none"> • Food eaten by participants on day of concentration test • Caffeine consumed by participants on day of concentration test • Noise levels participants complete concentration test in |

Theory summary

In this lesson, you have learnt about the difference between scientific and non-scientific ideas and some examples of each. You then went on to learn about some of the very first things researchers must define when designing a research study: a clear aim and hypothesis, and if it's an experiment, the independent and dependent variables. You also learnt about controlled variables and operationalising variables.

**Figure 6** A summary of the concepts learnt in this lesson

1A Questions

Theory review

Question 1

Psychology is considered non-scientific because it is a relatively new field and we don't know much about what goes on in the human brain.

- True.
- False.

Question 2

Ideas informed purely by anecdotes and personal opinions are non-scientific.

- True.
- False.

Question 3

Before beginning any kind of psychological investigation, a researcher should have a clear aim and at least one hypothesis. Which of the following are true with regard to hypotheses? **(Select all that apply)**

- I. You can have only one hypothesis.
- II. It sets out the overall goal of the research.
- III. It is a testable prediction.
- IV. In an experiment, it includes the predicted effect of one variable on another.

Question 4

In an experiment, researchers want to know the effect of the _____ variable on the _____ variable.

Which of the following best fills in the blanks?

- A. dependent; independent
- B. independent; dependent

Question 5

A controlled variable is

- A. a version of the independent variable with an exact and unchanging quantity or amount.
- B. a variable other than the independent or dependent variable that is kept constant in order to avoid it affecting the dependent variable.

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. A hypothesis is a **testable, tentative prediction about** the relationship between variables.
- B. A hypothesis is a **good guess of** the relationship between two variables.

Question 7

Which of the following sentences is most correct?

- A. The independent variable is what the researcher **actively manipulates** to see its effect on the dependent variable.
- B. The independent variable is what the researcher **records** to see its effect on the dependent variable.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

Which of the following is a similarity between scientific and non-scientific ideas?

- A. They both rely on anecdotal evidence and personal opinion.
- B. They can both make claims about human mental states and behaviour.
- C. They can both rely on methods like hypothesis testing and re-testing.
- D. They both make claims that can be accurately generalised to the population.

Question 9

Which of the following is a difference between an anecdote and empirical evidence?

- A. Anecdotes are used as a basis for scientific ideas, whereas empirical evidence generally is not.
- B. Empirical evidence is used as a basis for scientific ideas, whereas anecdotes are generally not.
- C. Anecdotes are factual and objective, whereas empirical evidence is not.
- D. Empirical evidence is never subject to bias, whereas anecdotes are.

Question 10

Which of the following is a similarity between controlled and independent variables?

- A. They are both actively controlled in some way by the researcher.
- B. They are both only measured by the researcher.
- C. They both are intended to have an effect on the dependent variable.
- D. They are both intended not to affect the dependent variable.

Exam-style**Remember and understand****Question 11** (1 MARK)

Which of the following is an example of a scientific idea?

- A. An idea based on anecdotal evidence.
- B. An idea based on opinion.
- C. An idea based on empirical evidence.
- D. A claim which cannot be tested.

Question 12 (1 MARK)

In an experiment, the independent variable is

- A. a method of research that is used to test a hypothesis.
- B. the variable that is manipulated by the experimenter.
- C. the variable that is measured by the experimenter.
- D. the variable that is held constant by the experimenter to avoid its effect on the dependent variable.

Question 13 (1 MARK)

A hypothesis

- A. is a question the research study sets out to answer.
- B. predicts how the dependent variable will affect the independent variable.
- C. is generated based on scientific knowledge or experience in order to understand and test ideas.
- D. is a method of research in which an experimenter manipulates the independent variable to observe the effect on the dependent variable.

Adapted from VCAA Psychology exam 2021 Q17

Question 14 (1 MARK)

Scientific ideas are not

- A. testable and verifiable.
- B. provisional.
- C. empirically backed.
- D. unchanging.

Apply and analyse

Use the following information to answer questions 15 and 16.

Sita wants to investigate the effect of highlighting words while reading on the ability to recall information from a specific text. Sita did not allow participants to underline or write notes when reading the text, only to use a highlighter.

Question 15 (1 MARK)

The independent and dependent variables for Sita's investigation are respectively

- A. highlighting words while reading and the ability to recall information.
- B. the ability to recall information and highlight words.
- C. highlighting words and not allowing participants to underline or write notes about the text.
- D. not allowing participants to underline or write notes and the ability to recall information.

Question 16 (1 MARK)

A controlled variable in Sita's investigation could be

- A. highlighting words while reading.
- B. the ability to recall information.
- C. the ability to recall information as measured by scores on a test.
- D. the environment in which the experiment is conducted.

Question 17 (1 MARK)

Priyal wants to conduct an experiment on the effect of florally-fragranced hair on levels of attraction. Write an aim for this experiment.

Question 18 (3 MARKS)

Dominic wants to investigate whether smoking marijuana before sleep leads to disjointed dreams. To test this, he conducted a study with some participants who smoked marijuana and some who did not, before measuring their dream content and structure.

Write a research hypothesis for this investigation.

Question 19 (3 MARKS)

Doctor Ziad wants to test the effect of anxiety medications on feelings of anxiety in individuals with specific phobias.

- a. Identify the independent and dependent variable for Doctor Ziad's study. (2 MARKS)

Independent variable: _____.

Dependent variable: _____.

- b. Suggest a potential controlled variable for this study. (1 MARK)

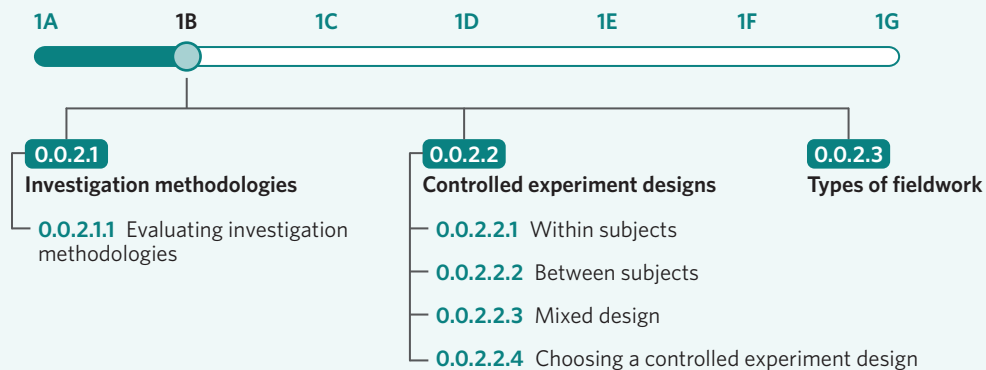
Question 20 (3 MARKS)

Gad wants to understand how teenagers' moods might be affected by minutes per day spent listening to music. Construct a hypothesis for an investigation that could test this.

1B Scientific research methodologies

KEY SCIENCE SKILLS

- Plan and conduct investigations
- Analyse and evaluate data and investigation methods



So, you want to study psychology. Maybe you want to know how the brain conceptualises time: why is it that sometimes time feels so fast, and then at others, so slow? Or, maybe you're interested in why some people think it's wrong to steal, whereas others don't. Maybe you're interested in the psychological processes behind why humans find it acceptable to yell aggressively at umpires when in a crowd at a sports match. Whatever the psychological phenomenon you are most interested in, there will be ways to study and investigate it.

In this lesson, you will learn about the different scientific investigation methodologies researchers can use to learn about psychological phenomena. Knowing which methodology to use for a given topic is an important research skill, so you will also learn how to evaluate them.



Investigation methodologies 0.0.2.1

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation
 - design and conduct investigations; select and use methods appropriate to the investigation, including consideration of sampling technique (random and stratified) and size to achieve representativeness, and consideration of equipment and procedures, taking into account potential sources of error and uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated
- Analyse and evaluate data and investigation methods
 - evaluate investigation methods and possible sources of error or uncertainty, and suggest improvements to increase validity and to reduce uncertainty

ACTIVITY

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There are many ways researchers investigate psychological phenomena. In this section of the lesson, you will learn about these different methods, which are referred to as ‘investigation methodologies’. You will also come to understand some circumstances under which each methodology might be used.

Theory details

In lesson 1A, you learnt about how researchers formulate a research question or topic and then create an aim before conducting research. Once researchers know their goals, they must decide the type of research and investigation methods that are best to help meet them. Psychological investigations can be conducted in a variety of ways depending on the question under investigation, the aim of the investigation, and the nature of the evidence required to answer the research question. **Investigation methodologies** refer broadly to any of the different processes, techniques and/or types of studies researchers use to obtain information about psychological phenomena. You may already be familiar with some investigation methodologies from your own life: surveys, for example, are an investigation methodology used in psychology. Each methodology has its own advantages and disadvantages, so it is important to carefully consider which methodologies best serve a particular research topic.

KEY TERMS

Investigation methodologies (also known as research methodologies) any of the different processes, techniques and/or types of studies researchers use to obtain information about psychological phenomena

USEFUL TIP

In this lesson, ‘investigation methodologies’ and ‘research methodologies’ are used interchangeably and mean the same thing.

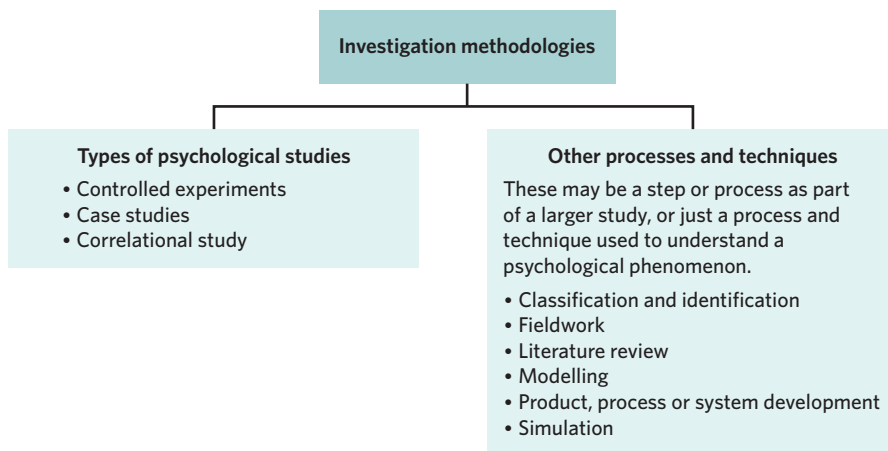


Figure 1 The types of investigation methodologies that you will learn about in this lesson

Types of psychological studies

Controlled experiments

A **controlled experiment** is a type of investigation which measures the causal relationship between one or more independent variables and a dependent variable, whilst controlling for all other variables. For example, a researcher may want to test the effect of alcohol consumption (the independent variable) on driving ability (the dependent variable). To do this, they may ask participants to consume a specified amount of alcohol (e.g. two standard drinks) and then perform a 15-minute driving circuit. They would then record the participants’ performance in some way and interpret these results to establish if there may be a relationship between these two variables.

Controlled experiments are one of the most scientifically rigorous and strict research methodologies used in psychology. As you learnt in the previous lesson, researchers aim to control the influence of variables outside the independent variable so that only the independent variable is able to influence the dependent variable.

Controlled experiment
a type of investigation in which the causal relationship between two variables is tested in a controlled environment; more specifically, the effect of the independent variable on the dependent variable is tested while aiming to control all other variables

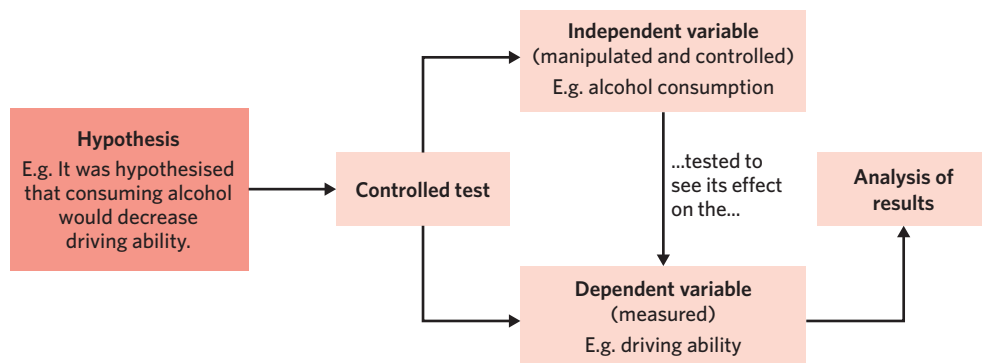


Figure 2 Controlled experiments involve testing a hypothesis about the causal relationship between variables

Case studies

A **case study** is an in-depth investigation of an individual, group, or particular phenomenon (activity, behaviour, event, or problem) that contains a real or hypothetical situation and includes the complexities that would be encountered in the real world. Case studies may be:

- historical, analysing causes and effects, and examining what was learnt.
- a real situation or a role-play of a hypothetical situation, upon which suggestions are made.
- problem-solving, where developing a new design or procedure is required (VCAA).

Case studies are useful for gathering highly detailed, in-depth information about an individual or small group of people. Many different forms of data are collected during case studies, including:

- participants' biographical history
- psychological and biological data (e.g. medical history)
- environmental information
- quantitative and qualitative data (e.g. data from self-reporting rating scales or in-depth interviews).

Case studies are often utilised when information is needed about a specific phenomenon that is rare or hard to study repeatedly with a larger group of people. For example, a case study is a useful methodology for studying people with brain injuries: it is extremely valuable to know the effects and implications of brain damage; however, it is highly unlikely that many people at one time would be experiencing the same brain injury and able to participate in an experiment or other ongoing, large-scale research methodology.

Correlational studies

A **correlational study** is a type of non-experimental study in which researchers observe and measure the relationship between two or more variables without any active control or manipulation of them. A distinguishing feature of correlational research is that the variables under investigation are only measured and not manipulated, unlike in experiments, where at least one variable is manipulated by the researcher and one is measured.

Correlational studies are conducted to identify which factors may be of greater importance to some phenomena, enabling predictions to be made and theories to be created and tested. As shown in figure 3, correlational research aims to find relationships between variables, describe them, and make predictions on the basis of them.

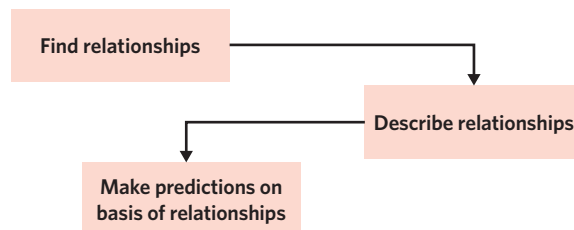


Figure 3 Aims of correlational research

Correlation refers to the strength of the relationship between variables, or in other words, how likely they are to occur together. A correlation can be positive (variables change together in the same way; i.e. both increase or decrease as the other does) or negative (variables change in opposite directions; i.e. as one increases the other decreases). There can also be zero correlation; i.e. no relationship between variables. At the end of any correlational research, the strength of correlation between variables is measured. Some types of correlational research include:

- some forms of fieldwork
- observational studies
- examining archival data (i.e. data collected before research begins)
- surveys.

Correlational studies are likely to be conducted when researchers wish to observe the general relationships and associations between variables, often in a real-world setting. Table 1 outlines some circumstances in which correlational research is more likely to be used.

Case study an in-depth investigation of an individual, group, or particular phenomenon (activity, behaviour, event, or problem) that contains a real or hypothetical situation and includes the complexities that would be encountered in the real world

Correlational study a type of non-experimental study in which researchers observe and measure the relationship between two or more variables without any active control or manipulation of them

USEFUL TIP

The primary difference between controlled experiments and other, non-experimental forms of psychological study is how researchers deal with variables. In experiments, researchers actively manipulate, measure, and control variables in highly controlled settings. In other forms of research, while there are variables, they are not so actively manipulated.

Table 1 Examples of circumstances in which correlational research is more likely to be used

| Circumstance | Example |
|--|---|
| The relationship between variables is less likely to be causal (i.e. two variables often occur together (correlate) but one does not necessarily cause the other). | The variable of high test scores on a VCE mathematics exam might correlate with high test scores for mathematics questions on the General Assessment Test, but one does not cause the other. This distinguishes this methodology from experiments, which are more controlled and aim to establish the specific effect of one variable on another. |
| There is thought to be a causal relationship between variables, but the variables are too difficult, dangerous, or unethical to actively manipulate. | If a relationship between rainfall and low mood is predicted, the variable of rainfall is impossible to manipulate, so researchers may instead elect to simply measure it and participants self-rated mood scores. |
| A new measurement procedure or tool needs to be tested. | If a research team develops a new emotional intelligence test and wants to see if it is accurate and reliable, they may provide this test alongside other, already validated emotional intelligence tests to see if there is a correlation between all tests' scores. |
| It is more valuable or practical to collect data in a real-world setting. | Parenting styles can be researched using both controlled experiments and correlational studies. To understand the effects of different parenting styles, a researcher may use correlational study methods, such as observing the different effects of these parenting styles within different family homes. This allows the researcher to quickly record multiple associations between parenting styles and children's behaviour. In contrast, a controlled experiment might be used when a researcher wishes to know the effect of one specific parenting style on a specific behaviour of children. The latter would require more careful planning and a more specific object of inquiry. |

USEFUL TIP

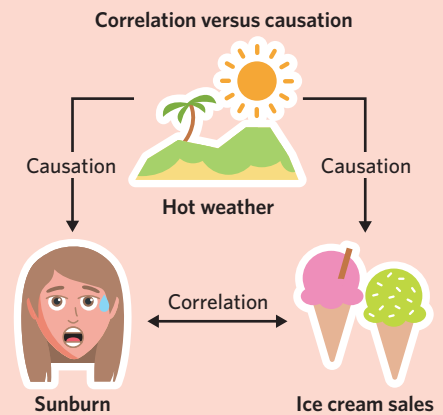
Correlation versus causation

To understand the difference between controlled experiments and correlational studies, it's important to know the difference between 'correlation' and 'causation'. Correlation refers to the strength of relationship between variables; i.e. how likely it is that they would occur together in some predictable way (e.g. if one increases, the other decreases). On the other hand, causation refers to a relationship between variables wherein a change in one variable causes a change in another (e.g. if one increases, the other decreases because of the other one). Correlation and causation can occur simultaneously; however, it's very important to know that correlation does not always equal causation.

Figure 4 presents an example of this concept.

Hot weather directly causes sunburn and an increase in ice cream sales, so causation is present. However, ice cream sales and sunburn are only correlated (specifically, increase together) and don't directly cause each other

In controlled experiments, researchers aim to establish a causal relationship. However, the experiment has to meet requirements, such as controlling extraneous variables, for causation to be determined. This ensures that the independent variable is the only variable responsible for changes in the dependent variable. As such, it is often difficult for causation to be established. In correlational studies, causation cannot be determined.



WANT TO KNOW MORE?

There are other types of psychological studies that are not explained here. If you are interested, you can research the following:

- observational studies – a type of correlational study in which a researcher passively watches participants with no active participation or intervention.
- longitudinal studies – a type of study and research design involving repeated observation of participants over a long time period at specified time intervals.
- cross-sectional studies – a type of study in which data is collected about a specific group of people (a research population) at one point in time.

Other processes and techniques

Classification and identification

As part of their research and practice, psychologists often need to classify and identify specific phenomena:

- **Classification** is the arrangement of phenomena, objects, or events into manageable sets.
- **Identification** is a process of recognition of phenomena as belonging to particular sets or possibly being part of a new or unique set.

These processes enable psychologists to create a theoretical language from which to describe and build upon their objects of inquiry, form theories, and make predictions.

Classification is used by psychologists to create labels or groups for phenomena that may help to provide some functional or theoretical benefit. For example:

- in clinical psychology, psychologists have created groupings of symptoms, behaviours, and other characteristics into different mental disorders. Major depressive disorder is one example. There are both functional and theoretical arguments in favour of such a classification system.
- in psychology, researchers may wish to classify different affects (emotions). For example, classifying a human affect as ‘disgust’ may involve understanding the set of characteristics (emotions, reactions, physiological responses and so on) that occur when ‘disgust’ is felt. This may have theoretical benefits, such as being able to research when or what causes disgust in humans.

Identification is used by psychologists to then ascribe phenomena to a particular classification; in other words, to assign certain things to their respective label or group. For example:

- clinical psychologists may diagnose a patient with a particular mental disorder based on matching what they observe in reality to the ‘set’ of symptoms in a classification system. This may allow them to provide an explanation for the patient’s symptoms and possibly more targeted treatment.
- In a study on people’s reactions to breaching moral codes or norms, such as violence, it may be helpful to identify different reactions, like disgust, in order to understand patterns of human behaviour and mental states.

Fieldwork

Fieldwork refers to any research involving observation and interaction with people and environments in real-world settings, conducted beyond the laboratory. It often involves the researcher collecting data first hand, and may be conducted through a range of methods including direct qualitative and/or quantitative observations and sampling, participant observation, qualitative interviews, questionnaires, focus groups and yarning circles. Fieldwork is generally used to determine correlation, rather than causation.

Fieldwork is often used when:

- researchers wish to investigate correlation rather than causation. For this reason, the circumstances in which correlational studies would be conducted also apply here.
- it is important to the research that data is collected in a real-world, authentic setting. For example, a study on the effect of fragrance on customer behaviour in a shopping centre would likely be conducted using methods of fieldwork in the shopping centre setting, rather than in a laboratory under highly controlled conditions. Likewise, the effects of hospital ward appearance, such as lighting, on patient recovery times would also likely be conducted using fieldwork.

Classification

the arrangement of phenomena, objects, or events into manageable sets

Identification a process of recognition of phenomena as belonging to particular sets or possibly being part of a new or unique set

Fieldwork

any research involving observation and interaction with people and environments in real-world settings, conducted beyond the laboratory

Literature review

the process of collating and analysing secondary data related to other people's scientific findings and/or viewpoints in order to answer a question or provide background information to help explain observed events, or as preparation for an investigation to generate primary data

Modelling

the construction and/or manipulation of either a physical model, such as a small- or large-scale representation of an object, or a conceptual model that represents a system involving concepts that help people know, understand, or simulate the system

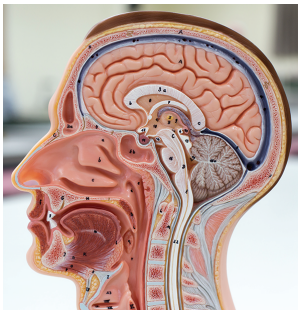


Image: Rattiya Thongdumhyu/Shutterstock.com

Figure 5 An example of a physical model is a cross-sectional model of the brain

Product, process, or system development

the design or evaluation of an artefact, process, or system to meet a human need, which may involve technological applications, in addition to scientific knowledge and procedures

Simulation a process of using a model to study the behaviour of a real or theoretical system

Literature review

Literature review refers to the process of collating and analysing secondary data related to other people's scientific findings and/or viewpoints, in order to answer a question or provide background information to help explain observed events, or as preparation for an investigation to generate primary data. Primary data refers to data collected first-hand by a researcher, whereas secondary data refers to data collected by others. You will learn more about primary and secondary data later in this chapter. A literature review helps researchers understand the current state of scientific knowledge and progress with regards to a certain topic or phenomenon.

This methodology is often used before conducting a new study and/or collecting primary data, or when someone begins to research a new topic. For example, if a researcher wants to investigate the effect of positive mood on prosocial behaviour, they may do a literature review by reading and summarising the current work on this topic. This would help them to refine their ideas and generate a clear topic for their own research that is more likely to address any gaps of knowledge in the scholarship.

Modelling

Modelling refers to the construction and/or manipulation of either a physical model, such as a small- or large-scale representation of an object, or a conceptual model that represents a system, involving concepts that help people know, understand, or simulate the system.

Modelling is used by psychologists and researchers to help them and others know, understand, problem solve, or simulate various psychological phenomena. Models can be:

- physical; for example, a plastic human brain. This can be used as an explanatory tool by psychologists wishing to explain brain processes and regions to patients, fellow researchers or students. Physical models are useful for explaining, simplifying, or demonstrating complex phenomena, especially when it is impractical or unethical to have the 'real' thing.
- conceptual; for example the multi-store model of memory. This divides human memory into three 'stores': sensory memory, short-term memory, and long-term memory. Conceptual models are useful for simplifying, explaining, or demonstrating complex systems and other phenomena. By representing memory in this way, psychologists are able to remove the 'noisiness' of many of the biological processes that occur in the brain, and just explain memory in simplified, lay-person terms.

Product, process, or system development

Have you ever used a meditation app on your phone? There are many technologies, products, processes, and systems created on the basis of scientific research and development that help people in their daily life. **Product, process or system development** refers broadly to the design or evaluation of an artefact, process, or system to meet a human need, which may involve technological applications, in addition to scientific knowledge and procedures.

Product, process or system development is used when psychologists, developers, or researchers have identified a human need that can be served by technology or scientific knowledge and procedures. For example, meditation apps were created to meet the human need of wanting a convenient way to practice mindfulness. Quality meditation apps may be informed by scientific research and were created on the basis of product development.

Simulation

Simulation refers to the process of using a model to study the behaviour of a real or theoretical system. Simulations are useful for understanding how different variables operate in a system. Researchers would be likely to use a simulation when it would be too complex, impractical, or dangerous to test the relationships between variables in reality.

Simulations may also be used for explanation and understanding. Think of neurons (a type of cell) in the brain firing or growing in response to learning. A computer program may be used to model what happens at the micro level and is valuable because it provides visual access to otherwise inaccessible phenomena.

Evaluating investigation methodologies 0.0.2.1.1

Choosing the best investigation methodology for your specific research question or aim can be difficult: it depends on the specific psychological phenomena under investigation, as well as the resources available to the researcher. In order to choose the most appropriate methodologies, it is important to understand their advantages and disadvantages.

Table 2 Advantages and disadvantages of different investigation methodologies

| Investigation methodology | Advantages | Disadvantages |
|--|---|--|
| Controlled experiments | <ul style="list-style-type: none"> • They allow researchers to infer causal relationships between, and draw conclusions about, specific variables. • They provide researchers with a high level of control over conditions and variables. • They follow a strictly controlled procedure so it can be repeated to check results. • They can allow researchers to test hypotheses more quickly than in real-world settings. • The high control of variables may mean prevention of extraneous and confounding variables. | <ul style="list-style-type: none"> • As they are often conducted in a laboratory or highly controlled setting, the setting may not be reflective of real life. This may affect participants' responses. • Because experiments involve human control and manipulation of variables, they are open to researcher error or 'experimenter effects'. • It can be time-consuming and expensive to manipulate and measure certain variables. • Confounding or extraneous variables can still occur. |
| Case study | <ul style="list-style-type: none"> • They provide highly detailed, rich information about a particular phenomenon under study. This can also provide new knowledge about other phenomena, e.g. studying brain trauma may inform us about brain function. • They allow phenomena, including rare phenomena, to be examined in depth, which can provide ideas for future studies and hypotheses. • They can incorporate other scientific methodologies to gain data. | <ul style="list-style-type: none"> • Results cannot be generalised (applied) to a wider population, as case studies often only involve a small group of people or one person. • Case studies are subject to researcher bias and errors, as often one or only a few researchers. • It can be difficult to draw conclusions about cause and effect. • Case studies can be time-consuming. |
| Correlational study | <ul style="list-style-type: none"> • There is no manipulation of variables required. • They can provide ideas for future hypotheses and research, as well as form the basis for theories. • They can provide information about the relationships and associations between variables. • They can be conducted in naturalistic settings, so findings are applicable to real work. | <ul style="list-style-type: none"> • Their results cannot draw conclusions about cause and effect. • They can be subject to the influence of extraneous variables. |
| Classification and identification | <ul style="list-style-type: none"> • It provides a common language to communicate about scientific phenomena. • It helps to simplify, explain and describe complex phenomena. • It allows scientists to form more targeted solutions or interventions to real problems. • It allows researchers to form theories and hypotheses about labelled phenomena. | <ul style="list-style-type: none"> • It can over-simplify reality. • Labels and language can be inaccurate and create bias. |
| Fieldwork | <ul style="list-style-type: none"> • It can be conducted in naturalistic settings, so findings are more applicable to the real world. This means it has high ecological validity. • Fieldwork provides rich, detailed data. • Fieldwork can use a broad range of different methodologies depending on the object of inquiry and resourcing needs. • As it can occur over a longer time period, it can uncover information that may not be immediately obvious to researchers and participants. | <ul style="list-style-type: none"> • It can be time-consuming and expensive to conduct and then record data. • It can generally not inform conclusions about cause and effect. • Due to lengthy procedures in a real-world setting, fieldwork is difficult to replicate in order to verify results. • It is difficult to control the environment and extraneous variables, as researchers do not precisely manipulate variables. |
| Literature review | <ul style="list-style-type: none"> • It provides background information on specific phenomena that can inform new studies and hypotheses. • It allows researchers to understand the current 'state of play' for a specific object of inquiry and answer questions. • Through information synthesis, it may uncover patterns of knowledge or gaps of knowledge. | <ul style="list-style-type: none"> • It may be time-consuming. • It may be difficult to do if little research has been done on a topic. |

Continues ►

Table 2 Continued

| Investigation methodology | Advantages | Disadvantages |
|---|--|---|
| Modelling | <ul style="list-style-type: none"> It can provide explanatory tools. Physical modelling allows researchers to know, understand and problem solve. Conceptual modelling can simplify and explain certain phenomena. | <ul style="list-style-type: none"> As models are often used to simplify and communicate ideas, they may over-simplify or inaccurately represent reality. |
| Product, process or system development | <ul style="list-style-type: none"> It creates products, processes and systems that may meet a human need. | <ul style="list-style-type: none"> It can be expensive and time-consuming. |
| Simulation | <ul style="list-style-type: none"> Simulation provides insight into potential circumstances and events. It allows researchers to view micro, hard-to-see phenomena, such as neurons, in detail. It allows researchers to see events that might otherwise be too time-consuming, dangerous or impractical to see in reality. | <ul style="list-style-type: none"> It can be time-consuming and expensive. It is subject to programming and human error so may not always be an accurate prediction or reflection of reality. |

Controlled experiment designs 0.0.2.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation
- Analyse and evaluate data and investigation methods
 - evaluate investigation methods and possible sources of error or uncertainty, and suggest improvements to increase validity and to reduce uncertainty

In the previous section, you learnt that controlled experiments are one type of study researchers conduct in psychology. You will now learn about the different experimental designs researchers can use in a controlled experiment: within subjects, between subjects, and mixed design.

Experimental group

the group of participants in an experiment who are exposed to a manipulated independent variable (i.e. a specific intervention or treatment)

Control group the group of participants in an experiment who receive no experimental treatment or intervention in order to serve as a baseline for comparison

Theory details

Controlled experiments are perhaps one of the most strict and rigorous methodologies used in psychological research. They are often used because they allow a researcher to strictly manipulate variables of interest (independent variables) in a controlled environment and measure their effect on another variable (the dependent variable). As mentioned, this allows researchers to infer a more causal relationship between variables. For example, researchers may want to know if the consumption of caffeine (IV) impacts alertness (DV).

In controlled experiments, there are control and experimental groups or conditions:

- An **experimental group** refers to the group of participants in an experiment who are exposed to a manipulated independent variable (i.e. a specific intervention or treatment).
- A **control group** refers to the group of participants in an experiment who receive no experimental treatment or intervention in order to serve as a baseline for comparison.

WANT TO KNOW MORE?

In most controlled experiments, it is expected that there is at least one control and one experimental group. In these scenarios, the control group serves as a valuable baseline with which to compare the results of an experimental group.

However, it is sometimes not possible to have both an experimental and a control group. For example, imagine a researcher wants to investigate the differences in reaction times between different sexes. Their independent variable is sex, so it is likely that their participants will be split into three groups – females, males, and other. However, the sex of participants is not something that this researcher can manipulate or randomise, and no one sex is acting as the ‘control’.

This type of experiment is known as a quasi-experiment.

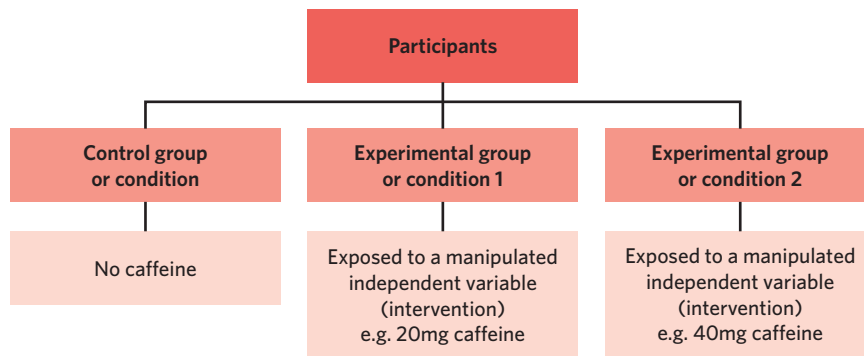


Figure 6 An experiment on the impact of caffeine on alertness, with one control group and two experimental groups

Within controlled experiments, there are different experimental designs. These designs determine the structure of an experiment in terms of what conditions participants complete. As with any investigation methodology, choosing the best or most appropriate experimental design depends on the research topic and the nature of evidence required to meet an experiment’s aim and inform its hypothesis. Three experimental designs that you will learn about are:

- within subjects
- between subjects
- mixed design.

Within subjects 0.0.2.2.1

A **within-subjects design** is an experimental design in which participants complete every experimental condition.

For example, in a within-subjects experiment on the effect of classical music on mood, participants may have their mood measured before listening to classical music and then while listening to classical music.

Between subjects 0.0.2.2.2

A **between-subjects design** is an experimental design in which individuals are divided into different groups and complete only one experimental condition.

For example, in a between-subjects experiment on the effect of natural light on patient recovery time in hospital, one group of participants may be in a hospital ward with natural lighting, and another group may be in a hospital ward without natural light. This allows the experimenter to compare the effect of different light sources on patient recovery time for participants in both groups.

WANT TO KNOW MORE?

A matched-participants design is a specific type of between subjects experimental design that attempts to control for participant differences across experimental conditions. In a matched-participants design, the sample is first grouped into pairs (‘matched-participants’) that share relevant characteristics, such as age, gender and so on. Each member of the pair is then assigned a different experimental condition so that their results may be compared.

Within-subjects design (also known as repeated measures or within-groups design)

an experimental design in which participants complete every experimental condition

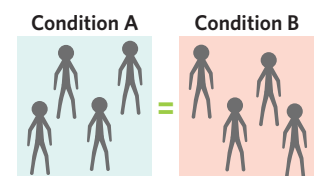


Figure 7 In within-subjects designs, participants complete every experimental condition

Between-subjects design (also known as independent-groups design or between-groups design)

an experimental design in which individuals are divided into different groups and complete only one experimental condition

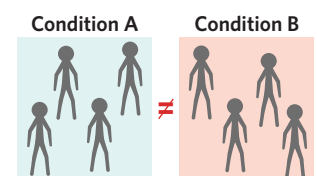


Figure 8 In a between-subjects design, each participant is assigned to only one experimental condition and completes just that condition

Mixed design
an experimental design which combines elements of within-subjects and between-subjects designs

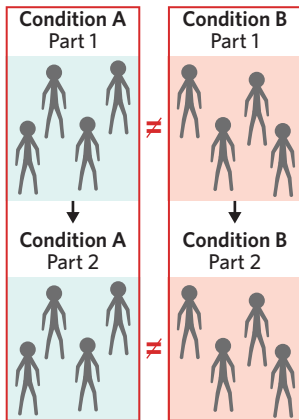


Figure 9 An example of a mixed design structure

Mixed design 0.0.2.2.3

A **mixed design** refers to an experimental design which combines elements of within-subjects and between-subjects designs. This allows experimenters to note differences that occur within each experimental group over time, and also compare differences across experimental groups.

For example, in an experiment about the role of smell in anxiety, a researcher may have two experimental conditions: the presence of an unpleasant smell and the presence of a pleasant smell. Participants may be divided into one of two experimental conditions and complete a task with either of the two smells present. This reflects a between-subjects design. However, the experimenter may also measure participants' anxiety in both groups before (to provide a baseline for comparison) and after the completion of a task with a smell present. This latter element reflects a within-subjects design. This allows participants' own results to be compared over time.

Choosing a controlled experiment design 0.0.2.2.4

Knowing which experimental design to choose is an important skill of researchers and depends on the specific object of inquiry, in addition to the time and resources available to conduct an experiment. Knowing the advantages and disadvantages of each design is a good starting point for choosing an appropriate experimental design.

Table 3 The advantages and disadvantages of different experimental designs

| Experimental design | Advantages | Disadvantages |
|-------------------------|--|---|
| Within subjects | <ul style="list-style-type: none"> Ensures that the results of the experiment are more likely due to the manipulation of the independent variable than any differences between participants that would occur if they were in separate groups. Less people are needed because each participant completes each experimental condition. Good for real-world settings and phenomena, such as the impact of certain teaching methods on learning (e.g. this could be assessed before with a pre-test, and after with a post-test when a teaching method is used on the same students). | <ul style="list-style-type: none"> It can produce order effects; i.e. completing one experimental condition first and then the other/s may influence how participants perform in the latter condition/s (e.g. due to fatigue, practice, participants' expectations, and so on). In addition, a participant dropping out of a within subjects experiment has a greater impact on the study as the experimenter loses two data points instead of one. |
| Between subjects | <ul style="list-style-type: none"> May be less time-consuming than within-subjects design as different participants can complete the different conditions simultaneously and procedures do not need to be repeated. Does not create order effects. | <ul style="list-style-type: none"> May require more participants than a within-subjects design. Differences between participants (participant differences) across groups can affect results (i.e. results may be due to the split of participants instead of the independent variable). |
| Mixed design | <ul style="list-style-type: none"> Allows experimenters to compare results both across experimental conditions and across individuals/participants/groups over time. Allows multiple experimental conditions to be compared to a baseline control group. | <ul style="list-style-type: none"> Can be more costly and time-consuming to plan, conduct, and then analyse results. Demanding for researchers and assistants to be across multiple methods. |

Types of fieldwork 0.0.2.3

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation

You have now learnt about the methodology of fieldwork and some of its advantages and disadvantages. You will now learn more about some of the specific research techniques used in fieldwork.

Theory details

To recap, fieldwork refers to any research involving observation and interaction with people and environments in real-world settings, conducted beyond the laboratory. It is a very important type of psychological research because it is said to have high ecological validity. This means that its findings can be applied well to the real-world, as it is generally conducted in naturalistic settings. This makes it different from controlled experiments in highly controlled settings, which have lower ecological validity.

Table 4 Types of fieldwork

| Types of fieldwork | Description |
|-------------------------------|---|
| Direct observation | A method of fieldwork in which a researcher watches and listens to the participants of a study, with no direct intervention and involvement, or manipulation of variables. |
| Qualitative interviews | Qualitative interviews involve a researcher asking questions to gather in-depth information about a particular topic, theme, or idea. The interview may be structured (or semi-structured), but the questions are generally open ended so that participants can provide lengthier, more detailed answers. This provides rich, qualitative data for the researcher to analyse. |
| Questionnaires | Questionnaires are a set of questions or prompts given to participants to answer digitally or with pen and paper. Questions may be open-ended, wherein participants can freely answer a question, or closed, wherein participants select an answer from a given set of responses. The answers of respondents are then analysed by a researcher. |
| Focus groups | Running focus groups is a qualitative research method which involves a researcher conducting a discussion with a small group of people (usually 8–12) on a specific topic. Groups are formed on the basis of some shared characteristics (e.g. participants’ background or demographics) relevant to the discussion. For example, a researcher may form a group with 14–16 year old adolescent girls and run a discussion on experiences and feelings of exclusion at high school. Participants’ responses and interactions with each other are recorded to form rich, qualitative data. |
| Yarning circles | In Aboriginal and Torres Strait Islander cultures, a yarning circle is a traditional approach to group discussion which involves talking, exchanging ideas, reflection and deep, considered listening without judgement. Conducting psychological research through yarning circles enables a more culturally appropriate approach to research and data collection when working with Aboriginal and Torres Strait Islander Peoples. Although they have been compared to Western focus groups, yarning circles are unique in their emphasis on a lack of judgement, letting go of preconceived notions, and key cultural principles such as respect, inclusion, and sharing. The role of the researcher is also different, as they must become an active member of the discussion, not just a neutral facilitator. The focus of the facilitator is not to obtain knowledge or information for themselves, but to contribute to a circular information exchange that can potentially produce new knowledge for all members. |



Figure 10 Certain types of fieldwork, such as focus groups or yarning circles, yield unique and valuable data

Theory summary

In this lesson, you learnt about the various investigation methodologies used to conduct psychological research and how to evaluate them. You also learnt more about the different experimental designs used in controlled experiments, as well as different types of fieldwork.

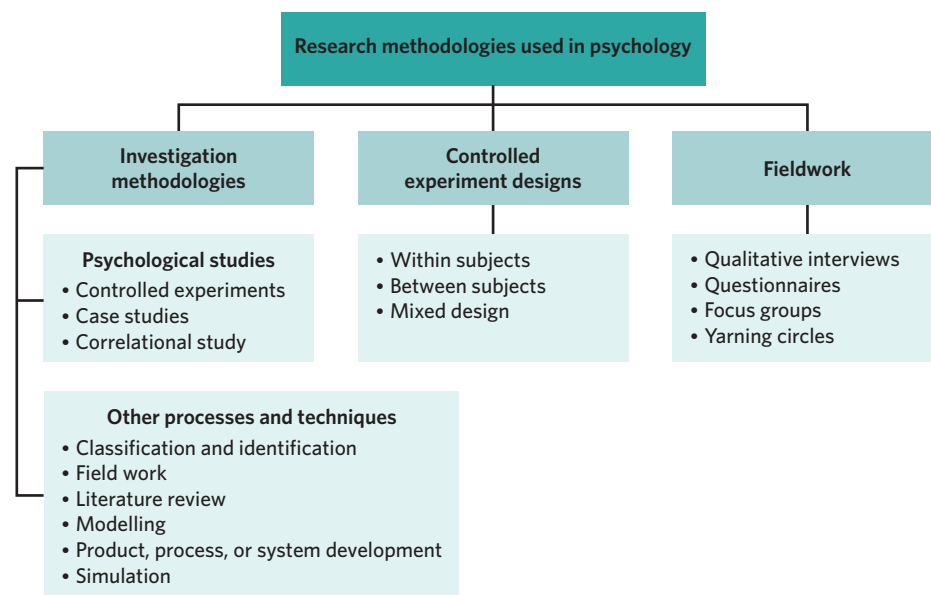


Figure 11 Summary of lesson 1B

1B Questions

Theory review

Question 1

In psychology, what do investigation methodologies refer to? **(Select all that apply)**

- I. Types of studies researchers can conduct.
- II. Processes and techniques used by researchers to obtain data.
- III. Only processes or techniques used during a study.

Question 2

When choosing the most appropriate investigation methodologies to use, researchers should consider **(Select all that apply)**

- I. the advantages and disadvantages of each methodology.
- II. the specific subject matter or topic they are studying.
- III. the nature of evidence required to answer the research question.

Question 3

One important type of study and methodology in psychology is a controlled experiment. Compared to other investigation methodologies, controlled experiments generally involve

- A. more control of variables and conditions.
- B. less control of variables and conditions.

Question 4

Because controlled experiments are so rigorous and strict, they all follow the same structure and approach.

- A. True.
- B. False.

Question 5

Which of the following are types of fieldwork? (Select all that apply)

- I. Controlled experiments.
- II. Within subjects.
- III. Yarning circles.
- IV. Focus groups.
- V. Direct observation.

Assessment skills**Perfect your phrasing****Question 6**

Which of the following sentences is most correct?

- A. A fundamental difference between experiments and correlational studies is that experiments involve active **manipulation** of at least one variable, whereas correlational studies only involve **measuring** variables.
- B. A fundamental difference between experiments and correlational studies is that experiments involve **changing** at least one variable, whereas correlational studies only involve active **recording** variables.

Question 7

Which of the following sentences is most correct?

- A. In a **within-subjects** experimental design, all participants complete all conditions of the experiment, whereas in a **between-subjects** design, they only complete one condition of the experiment.
- B. In a **between-subjects** experimental design, all participants complete all conditions of the experiment, whereas in a **within-subjects** design, they only complete one condition of the experiment.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies, and methods, and findings from three student practical activities

Use the following information to answer questions 8-10.

Tian is a budding researcher in the field of psychology. She is passionate about understanding the role that social media might play in forming extremist views and limiting open-mindedness to opposing political viewpoints. Tian really wants to do some sort of study on this idea, but hasn't done much research on it yet.

Question 8

Which of the following would be an appropriate investigation methodology for Tian to use at this stage of her research?

- A. Controlled experiment.
- B. Case study.
- C. Literature review.
- D. Simulation.

Question 9

After doing some background research, Tian decides to conduct some correlational research on the topic. An advantage of correlational research relevant to Tian is that it

- A. allows causal relationships between social media and extremist views.
- B. can provide ideas for future research and hypotheses about associations between social media and extremist views.
- C. cannot draw conclusions about cause and effect between social media and extremist views.
- D. can provide a common language to talk about social media and extremism.

Question 10

Which of the following is **not** a reason a correlational study is preferable to a controlled experiment for Tian at this stage of her research?

- A. Tian would like to understand the general associations between variables to get ideas for future hypotheses rather than attempt to uncover clear causal relationships.
- B. Because Tian is only just beginning initial research, there is not a clear and specific variable to manipulate and test the effect of.
- C. Tian would only have to worry about measuring variables, rather than actively manipulating them under highly controlled conditions.
- D. Tian is interested in understanding causal relationships between social media and extremist views.

Exam-style**Remember and understand****Question 11** (1 MARK)

An advantage of controlled experiments is that

- A. they have high ecological validity because they are conducted in real-world settings.
- B. when conducted well, they allow causation to be inferred.
- C. no active manipulation of variables is required by the researcher.
- D. they always prevent confounding and extraneous variables.

Question 12 (1 MARK)

A disadvantage of the between-subjects experimental designs is that

- A. they can produce order effects.
- B. they are demanding for researchers because they have to be across multiple methods.
- C. participant differences across groups may affect results.
- D. less people are needed because each participant completes each experimental condition.

Question 13 (1 MARK)

Which of the following best describes where fieldwork takes place and the role of the researcher?

| | Setting | Role of researcher |
|----|---------------------|--|
| A. | Laboratory | Actively manipulating variables |
| B. | Real-world settings | Actively manipulating but not recording or observing variables |
| C. | Laboratory | Recording and observing |
| D. | Real-world settings | Recording and observing |

Question 14 (2 MARKS)

Outline one advantage and one disadvantage of case studies as an investigation methodology.

Apply and analyse

Use the following information to answer questions 15 and 16.

Igor wants to volunteer for an organisation that helps recovering alcoholics. The organisation has identified five key risk factors that could potentially impair a volunteer's social and emotional wellbeing while they are in the role. Online, Igor is asked to answer a set of questions. The first set asks him to select out of a range of options which attributes best describe him. He is then asked to write a response to the prompt, 'describe why you think you would be suitable for this role.'

Adapted from VCAA Psychology exam 2021 Q45 and Q46

Question 15 (1 MARK)

The type of investigation methodology evident in this scenario is a

- A. case study, as it focuses only on Igor.
- B. correlational research, as it compares the relationships between variables.
- C. questionnaire, using closed questions and then an open-ended question.
- D. questionnaire, using open-ended questions and then a closed question.

Question 16 (1 MARK)

This investigation methodology is commonly used as a part of

- A. simulation.
- B. fieldwork.
- C. modelling.
- D. classification.

Question 17 (2 MARKS)

Compare the role of the researcher in controlled experiments and direct observation within fieldwork.

Question 18 (3 MARKS)

Waleed is a professor at a university and is teaching his psychology students about the ways neurons change in response to learning. To do this, he uses a computer software which allows him to zoom in on what neurons in the brain would look like when forming a new memory and projects this on a screen for his students to learn from.

What investigation methodology is Waleed using? Outline an advantage and a disadvantage of this methodology.

Evaluate**Question 19** (4 MARKS)

Django wants to test the efficacy of a new drug on concentration levels using a controlled experiment. To do this, he divides his 200 participants into two groups: one group receives the active treatment drug, while the other group receives an inactive tablet (placebo) that has no effect. Before beginning the experiment, every participant across both groups completes a test of concentration. After trialling either the drug or placebo, all participants complete the same test. Both groups' results are then compared.

Explain which controlled experiment design was used in Django's study. Outline one advantage and disadvantage of this design.

Questions from multiple lessons**Question 20** (1 MARK)

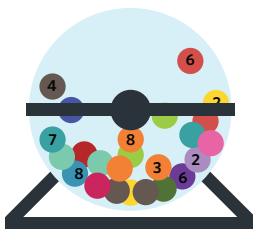
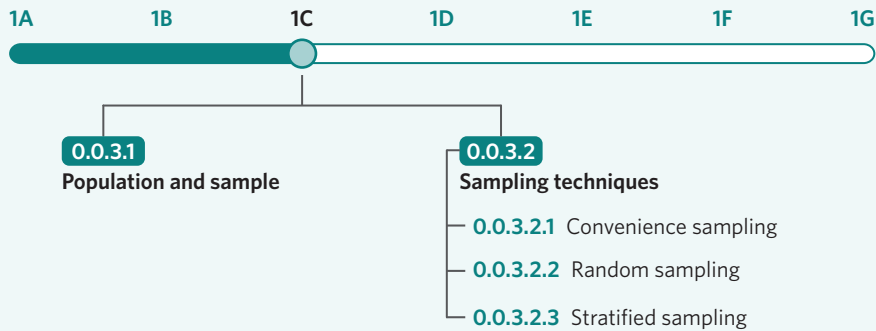
Which of the following best describes a role of the researcher and an aim of controlled experiments?

| | Role of researcher with regard to variables | Aim |
|----|---|---|
| A. | Manipulation of the independent variable. | To establish a causal relationship between variables. |
| B. | Only measurement of all variables. | To understand the general relationships and associations between variables. |
| C. | Manipulation of the dependent variable. | To establish a causal relationship between variables. |
| D. | Only measurement of all variables. | To understand the general relationships and associations between variables. |

1C Population, sample and sampling

KEY SCIENCE SKILLS

- Plan and conduct investigations



In the previous lesson, you learnt about all the different types of investigation methodologies researchers have to choose from. If they choose to conduct a controlled experiment, they must also decide exactly who the focus of the research is and then recruit people to participate in their study.

In this lesson, you will learn about the difference between a population (the people who are the focus of a study) and a sample (people who participate in a study), and the advantages and disadvantages of each method used to gather a sample.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Population (also known as research population) the group of people who are the focus of the research and from which the sample is drawn

LESSON LINK

In lesson **1A Introduction to research**, you learnt about the importance of having an experimental hypothesis. By limiting research to a specific population, researchers are better able to make conclusions about this hypothesis within the confines of a controlled experiment.

Population and sample 0.0.3.1

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - design and conduct investigations; select and use methods appropriate to the investigation, including consideration of sampling technique (random and stratified) and size to achieve representativeness, and consideration of equipment and procedures, taking into account potential sources of error and uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated

In any psychological experiment, researchers aim to investigate a particular group of people (the research population). However, populations can be very large and it can often be impossible to test everyone in them. As such, researchers must gather a smaller subset of people from the population to run their experiment on. This smaller subset is known as the study's sample.

Theory details

An important part of any psychological study is who the study is about. The **population** of an experiment refers to the group of people who are the focus of the research and from which the sample is drawn. For example, year 12 VCE Psychology students might be the focus of a study about academic stress, with ten classes across the state being selected to make up the sample. Confining research to a specific group of people allows researchers to draw conclusions and obtain knowledge about the group.

From the research population, a sample is drawn. The **sample** of a study, also considered the study's 'research participants', refers to a subset of the research population who participate in a study. A sample is used because it is often not possible to test everyone in a given population. For example, testing all year 12 VCE Psychology students would be difficult and time-consuming, so instead, a select group of the population would be used in the study. A sample's results can then be used to make conclusions about the wider research population; this is referred to as generalising results.

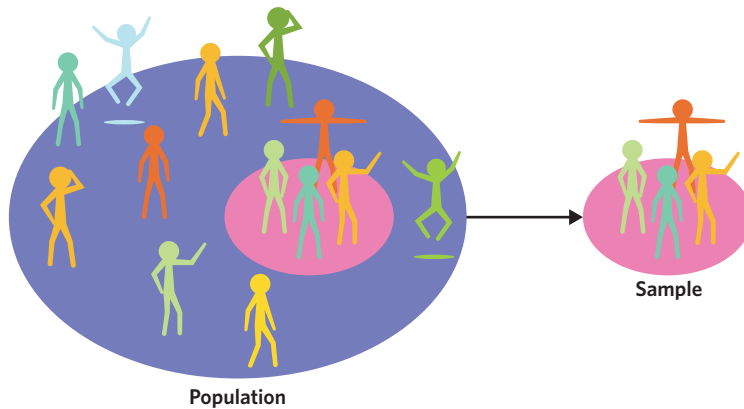


Figure 1 In a study, the population is the wider group of interest, while the sample refers to the people within the population who participate in the study, the sample's results may be generalised to the population

In an ideal world, the sample of a study would be highly representative of the research population. This allows a study's results to be more robust (accurate) and **generalisable** to the population. This refers to the ability for a sample's results to be used to make conclusions about the wider research population.

USEFUL TIP

To make the results of a research study generalisable, the research sample must be representative of the population. The word 'representative' means that the people in the sample represent the wider population by having the same characteristics.

Before you learn how to make a sample representative, there are some words you should understand.

- Each population can be described in terms of demographics, which simply means different factors or categories, such as gender, age, occupation, and many more.
- To make a sample representative, it must have the same proportion of relevant demographics as the target population.
 - 'Proportion' is a word used to describe the amount of something in relation to a bigger whole. For example, if you are cutting up a cake, and your friend gets a bigger piece than you, you may say that they got a bigger proportion of the whole cake.
 - In Psychology, your sample should have the same proportion of relevant characteristics as your target population.
 - For example, if you are running an experiment in your school and the population consists of 30% year 9's, then 30% of your sample must also be from year 9.

When you are evaluating how appropriate a sample is in an exam question, you can consider how representative the sample is likely to be of the entire population.

A highly representative sample would reflect the makeup of the research population in terms of the proportions of relevant demographics and other characteristics of the study. For example, in a study on Australian fathering styles, the sample should contain similar proportions of fathers to the population in terms of their ages, number of children, socioeconomic statuses, nationalities, and so on. By contrast, an unrepresentative sample would be more homogenous (containing the same kind); for example, selecting only 40-year-old Greek-Australian fathers with two children. This sample is not representative of the population of Australian fathers, and therefore, potential findings from this study would not be able to be generalised to the population.

Sample a subset of the research population who participate in a study
Generalisable (also known as generalisability) the ability for a sample's results to be used to make conclusions about the wider research population

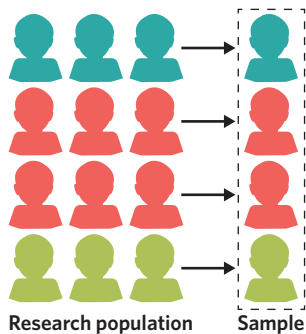


Figure 2 A representative sample occurs when certain demographic characteristics are included in proportion to how they appear in the population

Achieving a representative sample is dependent on:

- its size. The bigger a sample, the more likely it is to be representative of the population.
- the sampling techniques used. How a sample is selected can determine whether it is biased or representative in terms of how accurately it reflects the population's makeup.

Figure 2 shows how, although a sample may be smaller than the population, it can still be representative by having the same proportional makeup of different characteristics (as represented by the colours) that are present in the population.

Sampling techniques 0.0.3.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - design and conduct investigations; select and use methods appropriate to the investigation, including consideration of sampling technique (random and stratified) and size to achieve representativeness, and consideration of equipment and procedures, taking into account potential sources of error and uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated

There are different ways a sample can be gathered for an experiment, each with its own advantages and limitations.

Theory details

A sample is said to be representative when certain demographic characteristics are included in proportion to how they appear in the population. The way a sample is selected from the population for a study, known as the **sampling technique**, can influence whether this is achieved. There are three sampling techniques that you should be familiar with:

- convenience sampling
- random sampling
- stratified sampling.

Convenience sampling 0.0.3.2.1

Convenience sampling refers to any sampling technique that involves selecting readily available members of the population, rather than using a random or systematic approach. Some examples of convenience sampling include:

- asking the first 200 people who enter a sporting stadium to complete a survey.
- a psychology professor asking her students to participate in an interview.

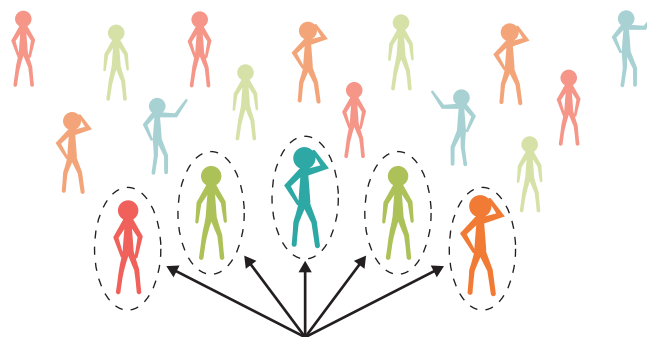


Figure 3 In convenience sampling, a researcher uses readily available members of the population

Random sampling 0.0.3.2.2

Random sampling refers to any sampling technique that uses a procedure to ensure every member of the population has the same chance of being selected. An example of random sampling is putting all members of a population's names into a computerised random generator to select a set of names for the sample.

Sampling technique

the way a sample is selected from the population for a study

Convenience sampling

any sampling technique that involves selecting readily available members of the population, rather than using a random or systematic approach

Random sampling

any sampling technique that uses a procedure to ensure every member of the population has the same chance of being selected

Stratified sampling 0.0.3.2.3

Within any given population, there are different subsets of people called strata. Strata reflect different demographic characteristics, such as age, socioeconomic status, or gender. **Stratified sampling** refers to any sampling technique that involves selecting people from the population in a way that ensures that its strata (subgroups) are proportionally represented in the sample. The process of stratified sampling involves:

1. dividing the research population into different strata based on characteristics relevant to the study.
2. selecting participants from each stratum in proportion to how they appear in the population, which is shown in figure 4. This selection process can be random (e.g. using a random generator) or systematic.

For example, in a study on VCE students, relevant strata may be age, gender, the type of school students attend (e.g. public, private, or independent), and the subjects they take. Once these strata have been identified, participants for the study could then be selected from each stratum in proportion to how they appear in the population. This could involve selecting every 100th student for each stratum on the VCE enrolment list that year (a systematic approach).

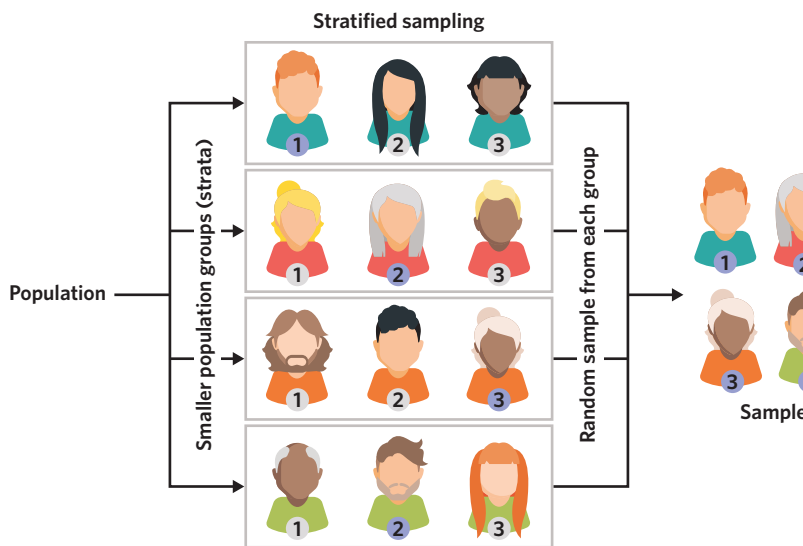


Figure 4 Stratified sampling involves dividing the population into distinct strata, and then making sure each stratum is proportionally represented within the sample

There are advantages and disadvantages in using each sampling technique. These are outlined in table 1.

Table 1 Advantages and limitations of each sampling technique

| Sampling technique | Advantages | Limitations |
|----------------------|---|--|
| Convenience sampling | <ul style="list-style-type: none"> The most time-effective and can be cost-effective. | <ul style="list-style-type: none"> The most likely to produce an unrepresentative sample, thereby making it harder for researchers to generalise results to the population. |
| Random sampling | <ul style="list-style-type: none"> The sample generated can be more representative than convenience sampling. It reduces experimenter bias in selecting participants. It can make a fairly representative sample if the sample is large. | <ul style="list-style-type: none"> It may be time-consuming to ensure every member of a population has an equal chance of being selected for the sample. It may not create an entirely representative sample when the sample is small. |
| Stratified sampling | <ul style="list-style-type: none"> The most likely to produce a representative sample. | <ul style="list-style-type: none"> It can be time-consuming and expensive. It can be demanding on the researcher to select the most appropriate strata to account for. |

Stratified sampling

any sampling technique that involves selecting people from the population in a way that ensures that its strata (subgroups) are proportionally represented in the sample

USEFUL TIP

In past VCAA exams, students have been asked to identify the sampling technique used when a researcher puts out an advertisement for participants in a newspaper or similar medium. This is an example of convenience sampling. By making a 'call out' for participants, the researcher is quickly and easily selecting the most readily available people (those who first respond to the advertisement), rather than following some process of random generation or stratification first.

Allocation the process of assigning participants to experimental conditions or groups

Allocation

Once a sample has been selected, researchers must allocate the participants to the different experimental groups or conditions. **Allocation** refers to the process of assigning participants to experimental conditions or groups. For example, in a study testing the effect of a new drug, there may be a control group (receives no active treatment) and an experimental group (receives the trial drug). Here, allocation would involve assigning half the participants to each group. A common type of allocation is random allocation, which ensures every sample participant has an equal chance of being allocated to any group within the experiment.

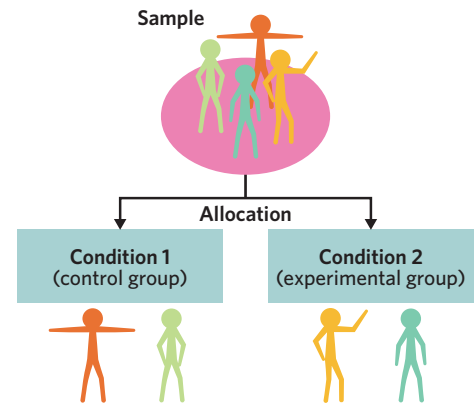


Figure 5 Allocation refers to the process of assigning participants to each experimental group or condition

Theory summary

In this lesson, you learnt the difference between a study's population and sample. You also learnt some different sampling techniques and some of their advantages and limitations. Importantly, you learnt that both the size of the sample and the sampling technique used can affect how representative a sample is of the research population.

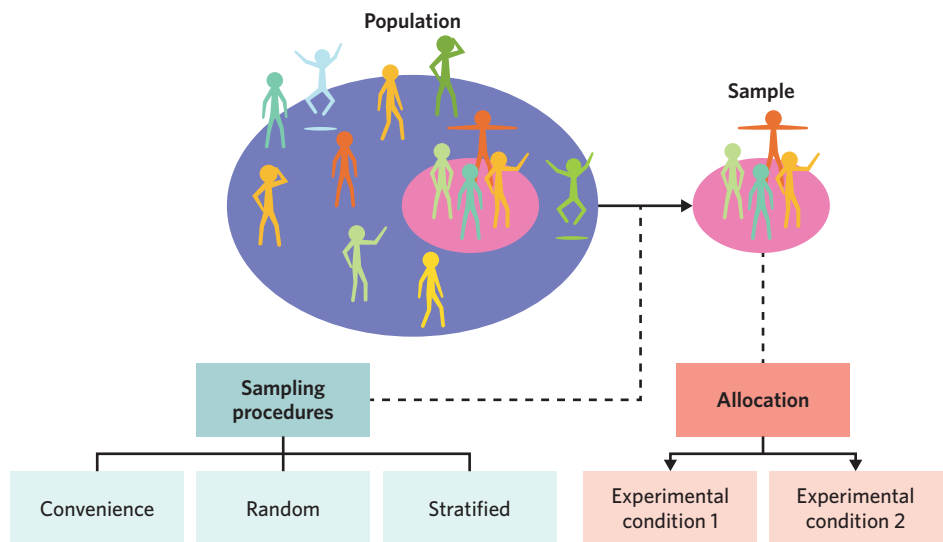


Figure 6 1C lesson summary

1C Questions

Theory review

Question 1

The population is

- A. the group of people who participate in a study.
- B. the group of people who are the focus of a study.

Question 2

The bigger the sample, the more likely it is to be representative of the population.

- A. True.
- B. False.

Question 3

Sample size is the only thing that may impact how representative a sample is of the population.

- A. True.
- B. False.

Question 4

Which type of sampling method is least likely to have a representative sample of the population?

- A. Convenience sampling.
- B. Random sampling.
- C. Stratified sampling.

Assessment skills

Perfect your phrasing

Question 5

Which of the following sentences is most correct?

- A. The representativeness of a sample refers to how well its results can be generalised to the population.
- B. The representativeness of a sample refers to how closely it resembles the characteristics of the research population.

Question 6

Which of the following sentences is most correct?

- A. Random sampling ensures that every member of the population has an equal chance of being selected to participate in the study.
- B. Random sampling ensures that every member of the population can participate in the study fairly.

Question 7

Which of the following sentences is most correct?

- A. Stratified sampling ensures that the sample includes people from each stratum in proportion to how they appear in the population.
- B. Stratified sampling ensures that the sample has the right number of people for every strata in the population.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

A similarity between random and stratified sampling is that they

- A. both involve dividing the population into subgroups as part of the sampling procedure.
- B. both tend to produce unrepresentative samples.
- C. can both involve a procedure of chance that ensures members of the population have an equal chance of being selected.
- D. both work best with a smaller sample size.

Question 9

A similarity between convenience and random sampling is that they

- A. both don't attempt to systematically account for a population's different subgroups.
- B. both work best with a smaller sample size.
- C. involve a procedure of chance to ensure each population member has an equal chance of being selected.
- D. both use the most readily-available participants.

Question 10

A difference between the research population and sample is that

- A. the results only apply to the population.
- B. the results only apply to the sample.
- C. the entire sample participates in the research, whereas the entire population does not.
- D. the entire population participates in the research, whereas the entire sample does not.

Exam-style**Remember and understand****Question 11** (1 MARK)

A limitation of stratified sampling is that it

- A. is difficult to ensure every member of the population has an equal chance of being selected.
- B. may be more time-consuming for the researcher.
- C. produces a highly representative sample.
- D. is unlikely to be representative.

Question 12 (1 MARK)

A sampling technique that uses a procedure that ensures that every member of the population has the same chance of being selected is

- A. convenience sampling.
- B. random sampling.
- C. stratified sampling.
- D. random allocation.

Question 13 (2 MARKS)

List two ways to increase the representativeness of a sample.

Question 14 (4 MARKS)

Using examples, compare how random sampling and stratified sampling are used to select a sample.

Apply and analyse**Question 15** (1 MARK)

Shaniqua is conducting a large study on the effect of providing factual information on aeroplane anxiety. To recruit participants, she puts sign-up poster advertisements around Melbourne airport lounges. What sampling technique is Shaniqua using?

- A. convenience sampling.
- B. random sampling.
- C. stratified sampling.
- D. random-stratified sampling.

Question 16 (4 MARKS)

Professor Truffles is investigating the potential effect of caffeine consumption and age-related cognitive decline amongst middle-aged Melbourne women. He needs to recruit 200 participants quickly in time for coordination with his team next month.

With reference to the conditions of Mr Truffle's study, explain one advantage and one limitation of Professor Truffles using convenience sampling.

Questions from multiple lessons

Use the following information to answer questions 17 and 18.

Dr Sleck investigated the effect of the drug MDMA on treating those with post-traumatic stress disorder (PTSD). Using 20 patients from his psychiatry clinic and his colleagues, he first measured the severity of their symptoms with a self-report questionnaire and a qualitative interview. After patients took the required dosage for six weeks, he then tested the severity of their symptoms again using the same measures.

Question 17 (1 MARK)

Identify the research design and sampling technique used by Dr Sleck.

| | Research design | Sampling technique |
|----|------------------|--------------------|
| A. | Between subjects | Random |
| B. | Within subjects | Convenience |
| C. | Mixed design | Stratified |
| D. | Case study | Random-stratified |

Question 18 (1 MARK)

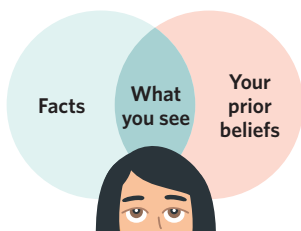
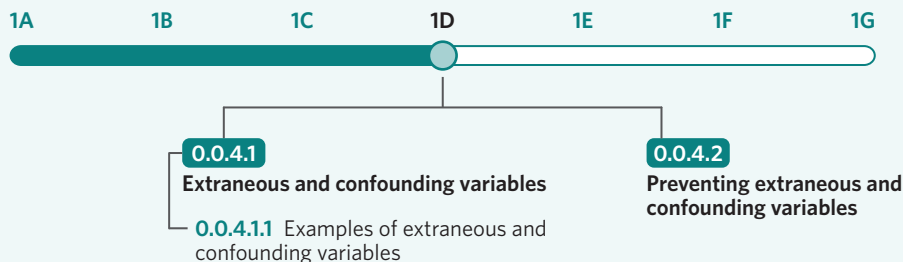
Based on the information provided, what might a disadvantage be of Dr Sleck's research?

- A. The sampling technique used may be time-consuming to ensure every member of a population has an equal chance of being selected.
- B. The sampling technique used is time efficient.
- C. It may produce order effects.
- D. Results between the two experimental conditions cannot be compared.

1D Preventing error and bias

KEY SCIENCE SKILLS

- Plan and conduct investigations
- Analyse and evaluate data and investigation methods



When conducting research, there are many unexpected things that can occur. This can introduce error and bias, and impact the results of the study. In this lesson, you will learn about some of the problems researchers can face when conducting experiments, as well as ways to prevent or minimise them.

Extraneous and confounding variables 0.0.4.1

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Plan and conduct investigations
 - design and conduct investigations; select and use methods appropriate to the investigation, including consideration of sampling technique (random and stratified) and size to achieve representativeness, and consideration of equipment and procedures, taking into account potential sources of error and uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated

As you've learnt, the aim of a controlled experiment is to establish a causal relationship between the independent variable and the dependent variable. To ensure that a clear conclusion can be drawn, researchers must exclude other possible explanations for their results. Part of this involves accounting for extraneous and confounding variables.

Theory details

Picture this: your VCE Psychology class has been selected to participate in a study on the effect of using mnemonic devices on information retention, as measured by your Psychology SAC and final exam scores. Mnemonic devices refer to devices that help people to remember information, such as the use of rhymes or acronyms. At the end of the year, the study's results show that you and your classmates have performed well above the state's average. It must surely be due to all the mnemonic devices you've been using! Or is it? Can you think of any other possible reasons (variables) for your exceptional scores? Maybe it is thanks to your amazing teacher or the resources offered by your school? Maybe you're all just really hard-working individuals who love the subject, or maybe your school canteen served you all performance-enhancing lunches for the past year.

In experimentation, errors refer to changes to the dependent variable caused by something other than the independent variable. All good psychological research must consider what errors may arise when conducting the research and take steps to prevent these errors. All other variables that may affect the dependent variable, be it performance-enhancing food or an amazing teacher, are referred to as extraneous variables. An **extraneous variable** is any variable that is not the independent variable but may cause an unwanted effect on the dependent variable. These variables should be controlled (kept constant between experimental groups), or at least monitored, so that they do not interfere with the results.

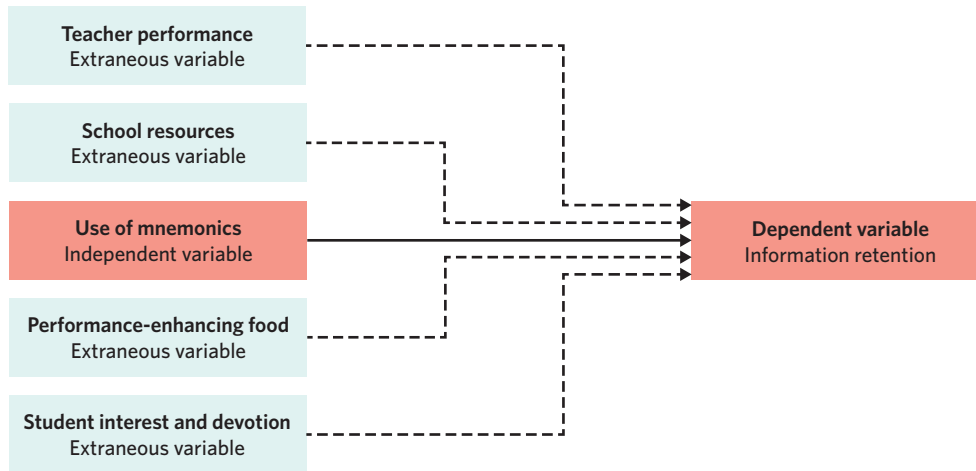


Figure 1 In an experiment, extraneous variables are variables other than the independent variable which may affect the dependent variable (results)

Unfortunately, it is not always possible to control for all extraneous variables. This can happen for a variety of reasons, such as time, cost, and practical constraints, or just by simply not being able to predict something. If, at the conclusion of a study, a variable other than the independent variable can be identified as definitely affecting the results, it becomes a confounding variable. A **confounding variable** refers to a variable that has directly and systematically affected the dependent variable, apart from the independent variable. A confounding variable may have been an extraneous variable that has not been controlled for, or a variable that simply cannot be controlled for. Confounding variables interfere with the investigation by providing alternate explanations for the results, as it cannot be confirmed whether the independent variable or confounding variable caused the changes to the dependent variable.

Importantly, confounding variables can only be identified at the end of an experiment, as they must be shown to have systematically (consistently and in a predictable way) and directly affected results. This can only be known by analysing the results. For example, in the study your class participated in, maybe the resources your school offered systematically and directly affected your SAC and exam scores. In order to identify this as a confounding variable, some pattern of the resources' effect must be identified in the results; for example, maybe the more students in a class that used the resources, the higher that class's results were. This shows that the variable (school resource use) affected the results in a systematic and direct way.

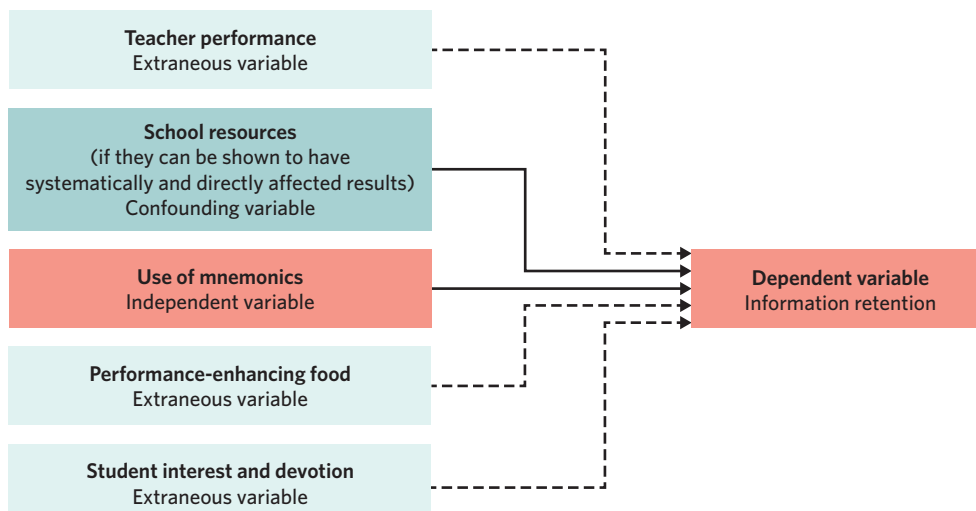


Figure 2 If a variable, other than the independent variable, has been shown to affect the dependent variable in a systematic and direct way, it is a confounding variable

KEY TERMS

Extraneous variable

any variable that is not the independent variable but may cause an unwanted effect on the dependent variable

LESSON LINK

As you learnt in lesson **1A Introduction to research**, when extraneous variables are accounted for and controlled (held constant), they are known as controlled variables.

Confounding variable

a variable that has directly and systematically affected the dependent variable, apart from the independent variable

USEFUL TIP

The word 'confound' means to confuse. Confounding variables confound or confuse results as researchers cannot conclusively say whether the results were due to the effect of the independent variable or the dependent variable as the effect of these two types of variables are unable to be differentiated within the study.

Examples of extraneous and confounding variables 0.0.4.1.1

In order to best prevent possible extraneous and confounding variables to improve your research, it helps to be aware of some common sources of error. In this lesson, you will learn about the following types of extraneous and confounding variables:

- participant-related variables
- order effects
- placebo effects
- experimenter effects
- situational variables
- non-standardised instructions and procedures
- demand characteristics.

Participant-related variables

Participant-related variables, also known as individual participant differences or subject variables, refer to characteristics of a study's participants that may affect the results. This includes characteristics like participants' age, intelligence, and socioeconomic status. When they are not a feature of the experiment, participant-related variables can be extraneous or confounding variables as they are likely to vary within the sample, and subsequently impact the results of the study. For example, in the experiment on the effect of mnemonic devices on information retention, participants' intelligence may be a participant-related variable that could impact the dependent variable.

Order effects

Order effects refers to the tendency for the order in which participants complete experimental conditions to have an effect on their behaviour. This occurs primarily in within-subjects experimental designs. Some examples of order effects include:

- practise effects, which mean that participants perform better in later conditions due to having done it before.
- fatigue effects, which mean that participants perform worse in later conditions due to being tired or bored from completing a prior task.

Imagine you are conducting research on the effect of caffeine on driving. You want to compare how well participants complete a driving circuit both with and without the influence of caffeine. You ask participants to complete the course first without having any caffeine, and then again after consuming 40 mg of caffeine. How might this impact results? By practising the driving course, participants may perform better the second time they complete it. Contrastingly, participants may experience fatigue effects due to having had a long day at the driving school. Either way, the impact of order effects makes it difficult to say that caffeine had an impact on driving quality.

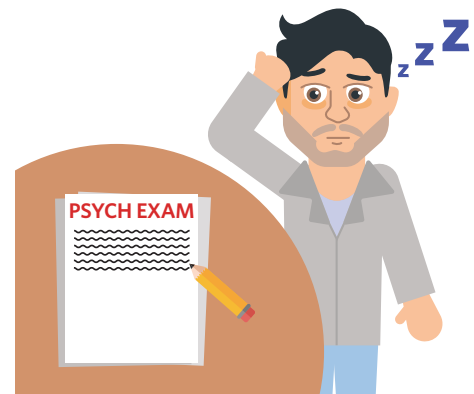


Figure 3 Fatigue effects are one example of order effects

Placebo effects

A **placebo** is an inactive substance or treatment, such as a sugar pill. The **placebo effect** refers to when participants respond to an inactive substance or treatment as a result of their expectations or beliefs. In other words, participants' responses are not due to the chemical properties of a substance taken, the processes in an intervention, or their allocation to an experimental condition, but rather how they believe it should make them feel or act. Imagine you are given a pill that is said to wake you up. An hour after taking it, you feel spritely and alert, only to be told that the pill contains only herbs that, if anything, should make you sleepy. You would be experiencing the placebo effect, as your brain's expectation of what would happen influenced how you felt. Importantly, this does not mean that what you felt was false or not real, but rather, was caused by your psychological expectations. Our mind is a very powerful thing! This can be a problem for researchers, as without careful control, it may be unclear whether results are due to what the researcher is trialling or due to participants' expectations.

Participant-related variables (also known as individual participant differences)

characteristics of a study's participants that may affect the results

Order effects

the tendency for the order in which participants complete experimental conditions to have an effect on their behaviour

LESSON LINK

Order effects are a limitation of within-subjects designs, which you learnt about in lesson **1B Scientific research methodologies**.

Placebo an inactive substance or treatment

Placebo effect when participants respond to an inactive substance or treatment as a result of their expectations or beliefs

Experimenter effects

The **experimenter effect**, also known as experimenter bias, refers to when the expectations of the researcher affect the results of an experiment. If experimenters have strong expectations or wish to see a certain result, they may inadvertently bias the way they collect and record data, or how they interact with participants. For example, they may be more likely to pay attention to what confirms their expectations (confirmation bias), leading to inaccurate results.

Situational variables

Situational variables refer to any environmental factor that may affect the dependent variable. Temperature, lighting, weather, and time of day are all examples of situational variables. When these can or do affect the dependent variable in an unwanted way, they become extraneous and/or confounding variables. For example, if a room is too hot, this may affect participants' concentration on a test. If test performance is the dependent variable, then the temperature would be an extraneous variable. This would particularly lead to error if different participants were exposed to different situational variables, such as some being in a cool temperature room and others in a hot temperature room, as their task performance (dependent variable) may vary due to temperature rather than their ability.



Figure 4 Background noise is one situational variable that may be an extraneous variable, depending on the experiment

Non-standardised instructions and procedures

As you know, experiments have at least two groups or conditions. Although they may be testing different manipulations of the independent variable, it is very important that the procedures in each group are as similar as possible. This ensures the results are more likely to be due to the independent variable and not some variation in the testing environment. For example, if you are testing the effect of background music on test performance, one group may complete the test with background music while another completes it without. To be able to draw a conclusion about the difference between the two groups, the conditions of the test should be the same: participants should have similar lighting and temperature, and complete it at similar times. Furthermore, the procedures should be the same: participants should receive the same instructions, amount of time, use the same materials, and so on. **Non-standardised instructions and procedures** occur when directions and procedures differ across participants or experimental conditions. This introduces unwanted situational variables for either specific participants or entire experimental groups.

Demand characteristics

Demand characteristics refer to cues in an experiment that may signal to a participant the intention of the study and influence their behaviour. These can be extraneous variables as participants may be more likely to conform to the study's hypothesis and meet the study's 'demands'. For example, participants may be in a study that first asks them to complete a questionnaire about their ability to concentrate. This may signal to participants that the study is testing concentration in some way, so for the following test procedures, they are highly alert.

Experimenter effect (also known as experimenter bias)

when the expectations of the researcher affect the results of an experiment

Situational variables

any environmental factor that may affect the dependent variable

Non-standardised instructions and procedures

when directions and procedures differ across participants or experimental conditions

Demand characteristics

cues in an experiment that may signal to a participant the intention of the study and influence their behaviour

Preventing extraneous and confounding variables

0.0.4.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Analyse and evaluate data and investigation methods
 - evaluate investigation methods and possible sources of error or uncertainty, and suggest improvements to increase validity and to reduce uncertainty

Although there are many ways extraneous and confounding variables occur, there are also many ways experimenters can prevent them. We will now look at some of these ways.

Theory details

Sampling size and procedures

Having a large sample size increases the sample's representativeness of the population, which means that the sample is more likely to have a similar level of diversity as it does in the population. Therefore, if a study has a large sample, the findings from that study are more likely to be unbiased, compared to a small sample which may lack diversity, and therefore be biased. For example, a study investigating mental health and wellbeing among adults which contains a tiny sample of three adults in their 20s, may find that levels of mental health and wellbeing are particularly low. However, this finding may have been impacted by the biased sample, as it does not account for adults in other age groups, and is therefore not representative of the population.

You can also think about the impact of sample sizes when considering individual participant differences. In smaller samples (e.g. a study with three people), if a participant's data is an outlier there will be more pronounced effects on the results than in a larger sample (e.g. a study with 3000 people), where the outlier may not impact the overall mean, or other results.

Furthermore, using more objective sampling procedures, like random or stratified sampling also ensures a more representative sample, which again, helps to ensure a sample which is unbiased.

Experimental design choice

As you now know, the extraneous variable of 'order effects' occurs in a within-subjects design. Choosing an alternative design when order effects may be an issue is one way to prevent this extraneous variable. Conversely, a within-subjects design prevents participant differences from impacting results, because the same people are completing each condition.

Counterbalancing

As you've learnt, there are advantages to using a within-subjects experimental design. Fortunately for researchers, there is a way to minimise or at least account for the influence of order effects on results without choosing a different design. This is known as counterbalancing.

Counterbalancing is a method to reduce order effects that involves ordering experimental conditions in a certain way. A common example may involve splitting the participants in half: one half completes one experimental condition (A) first, followed by the other condition (B). The other half of participants complete the conditions in reverse order (B, then A). Therefore, the results of each participant in each condition can still be compared as they still complete every experimental condition. It also ensures that any results due to order effects are accounted for, as each order is tested equally. As a result, any overall change in the dependent variable across all participants cannot be due to the order in which conditions were completed. Furthermore, the results across alternative orders may be examined independently to determine if any order effects had a major impact.

Counterbalancing
a method to reduce order effects that involves ordering experimental conditions in a certain way



Figure 5 How counterbalancing may occur

Placebo

Studies that test the efficacy of new drugs or treatment interventions typically have at least two experimental groups. One group is generally provided with the active substance or intervention, while another group may be given a placebo. As a reminder, a placebo (not to be confused with the placebo effect) is an inactive substance or treatment, such as a sugar pill. The purpose of providing placebos is to compare the results of participants given an active intervention, with those who are in the controlled placebo group. If those who received the true substance or intervention showed significantly different responses compared to the control group (who received the placebo), researchers may make firmer conclusions about the effectiveness of the trial substance or intervention. In this way, placebos don't necessarily stop the placebo effect, but help researchers understand how significantly an active intervention may affect individuals. If there is no significant difference in results between groups, researchers would not be able to conclude that the effect of an intervention (e.g. an active pain medication) is stronger than a placebo effect in response to a placebo (e.g. a sugar pill).

Single-blind procedures

A **single-blind procedure** is a procedure in which participants are unaware of the experimental group or condition they have been allocated to. This helps reduce participants' expectations; for example, they may not know whether they are receiving a placebo or the active medication. This also demonstrates how single-blind procedures may reduce the placebo effect. Similarly, single-blind procedures can also minimise demand characteristics, as there are fewer cues participants can use to infer a study's hypothesis, and other participant expectations which may influence results.

Double-blind procedures

A **double-blind procedure** is a procedure in which both participants and the experimenter do not know which conditions or groups participants are allocated to. For example, in a study testing the efficacy of a new medication, neither the experimenter nor the participants would know if they were receiving the active drug or a placebo. Instead, a research assistant would record the allocations. This helps to prevent the extraneous variables of experimenter and participant expectations.

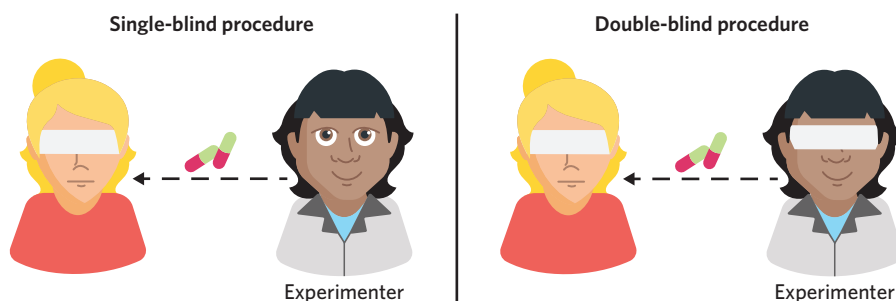


Figure 7 How a single versus double-blind procedure might work when trialling a new medication

Standardised instructions and procedures

Ensuring that each participant in an experiment receives the exact same instructions and follows the same procedures in each condition allows researchers to more conclusively infer that results are due to the independent variable. This minimises the extraneous variables of non-standardised instructions and procedures (situational variables).

Controlled variables

As you learnt in lesson 1A, experimenters may hold certain variables, other than the independent variable, constant. This is when they become 'controlled variables', so that their impact is systematically minimised and accounted for. This can be used for a range of extraneous variables. For example, in a study on the effect of running on mood, the situational variable of time of day may be held constant for all experimental conditions. This is a controlled variable enabled by having standardised procedures.

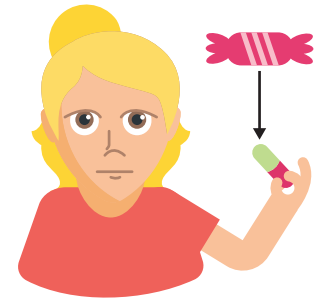


Figure 6 Placebos are often administered in experiments that test the efficacy of a new drug or treatment. Randomised, double-blind placebo controlled studies are considered the 'gold standard' in such research

Single-blind procedure

a procedure in which participants are unaware of the experimental group or condition they have been allocated to

Double-blind procedure

a procedure in which both participants and the experimenter do not know which conditions or groups participants are allocated to

Theory summary

In this lesson, you learnt about various kinds of extraneous and confounding variables. You also learnt about the strategies researchers may use to prevent or minimise their effects. Table 1 summarises these.

Table 1 Summary of the ways to prevent different extraneous and confounding variables

| Ways to prevent extraneous and confounding variables | The extraneous and confounding variables this can prevent, minimise or account for |
|--|--|
| Sampling size and procedures | <ul style="list-style-type: none"> Participant-related variables |
| Experimental design choice | <ul style="list-style-type: none"> Order effects, if a within-subjects design is not used Participant-related variables (differences), if within-subjects or a matched-participants design is used |
| Counterbalancing | <ul style="list-style-type: none"> Order effects |
| Placebo | <ul style="list-style-type: none"> Placebo effects |
| Single-blind procedures | <ul style="list-style-type: none"> Participant-related variables and expectations Demand characteristics Placebo effect |
| Double-blind procedures | <ul style="list-style-type: none"> Experimenter effects Participant expectations Demand characteristics |
| Standardised testing conditions and procedures | <ul style="list-style-type: none"> Situational variables Non-standardised testing conditions and procedures Demand characteristics |
| Controlled variables | <ul style="list-style-type: none"> Most extraneous variables that have the ability to be controlled |

1D Questions

Theory review

Question 1

Extraneous and confounding variables are both **(Select all that apply)**

- I. undesirable in an experiment.
- II. variables that have affected the dependent variable in an unwanted way.
- III. something which researchers should aim to prevent.
- IV. determined at the conclusion of a study.

Question 2

It is possible to prevent all extraneous variables.

- A. True.
- B. False.

Question 3

The difference between extraneous and confounding variables is that you cannot control confounding variables, whereas you can control extraneous variables.

- A. True.
- B. False.

Question 4

Which of the following are ways to prevent extraneous and confounding variables? **(Select all that apply)**

- I. Placebo effects.
- II. Standardised instructions and procedures.
- III. Situational variables.
- IV. Single-blind procedures.
- V. Double-blind procedures.

Assessment skills

Perfect your phrasing

Question 5

Confounding variables are variables that

- A. have **systematically** and **directly** affected the dependent variable in an unwanted way.
- B. have **methodically** and **consistently** affected the dependent variable in an unwanted way.

Question 6

The placebo effect occurs when

- A. participants are given an inactive substance.
- B. participants have a response to an inactive intervention due to their expectations and beliefs.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 7

A difference between practice effects and fatigue effects is that

- A. practice effects are an example of order effects, whereas fatigue effects are not.
- B. practice effects are more likely to improve performance, whereas fatigue effects are not.

Question 8

A difference between a placebo and the placebo effect is that

- A. a placebo is a substance, whereas the placebo effect is a change in thoughts, feelings or behaviour.
- B. a placebo is a real thing, whereas the placebo effect is fake.

Question 9

A similarity between single and double-blind procedures is that they

- A. both prevent extraneous variables due to participants' expectations.
- B. both prevent extraneous variables due to the experimenter effect.

Exam-style

Remember and understand

Question 10 (1 MARK)

Which of the following is a way to control the extraneous variable of experimenter bias?

- A. single-blind procedures
- B. double-blind procedures
- C. counterbalancing
- D. order effects

Question 11 (1 MARK)

Which of the following is an example of a situational variable?

- A. experimenter bias
- B. participant differences
- C. temperature
- D. confounding variables

Question 12 (3 MARKS)

Using an example, explain how single-blind procedures may be used to control for extraneous variables.

Apply and analyse

Use the following information to answer questions 13 and 14.

Jojo conducted research to find out whether the type of exercise people performed affected their levels of stress. Twenty participants were exposed to simulations of two different stressful scenarios. In the morning, the participants were told to swim immediately after exposure to the first simulation and, in the afternoon, they were told to do yoga immediately after exposure to the second simulation. Physiological measures of stress were used before and during the simulations. Higher levels of arousal indicated greater stress.

Readings from the EEG and EMG were quantified as stress level scores from 0 to 10. A change score was calculated by subtracting the pre-simulation stress level score from the during-simulation stress level score

Question 13 (1 MARK)

Which one of the following is a potential confounding variable in Jojo's research?

- A. using the same participants in both conditions, as there may be fatigue effects
- B. using only 20 participants, as this does not allow for generalisation of the results
- C. telling participants to use a particular form of exercise, as this may bias participants
- D. using only one strategy in each condition, as this does not allow for comparison

Adapted from VCAA Psychology exam 2019 Q11

Question 14 (1 MARK)

What is one strategy Jojo could use to account for the potential confounding variable outlined in question 13?

- A. order effects
- B. single-blind procedures
- C. counterbalancing
- D. the use of a placebo

Question 15 (2 MARKS)

Doctor Pest is conducting a between-subjects experiment on the role that caffeine may play in anxiety symptoms at work.

Doctor Pest identifies three different groups, each comprising 20 people, for comparison:

- Group A is to consume 60mg of coffee in the morning.
- Group B is to consume 30mg of coffee in the morning.
- Group C is to consume no coffee in the morning.

Identify one relevant extraneous variable that Doctor Pest should consider in designing his investigation.

Justify your response.

Adapted from VCAA Psychology exam 2018 Q6c

Questions from multiple lessons

Use the following information to answer questions 16 and 17.

Dr Snuff is wishing to test the efficacy of a new sleeping medication. She allocates the participants into one of the two groups. In her experiment, group 1 are given the trial medication and group 2 are given a sugar pill, which has no active ingredients.

Question 16 (1 MARK)

The sugar pill given to group 2 is

- A. a placebo, intended to account for the placebo effect.
- B. the placebo effect, intended to account for the placebo.
- C. a placebo, intended to account for experimenter bias.
- D. the placebo effect, intended to account for participant differences.

Question 17 (1 MARK)

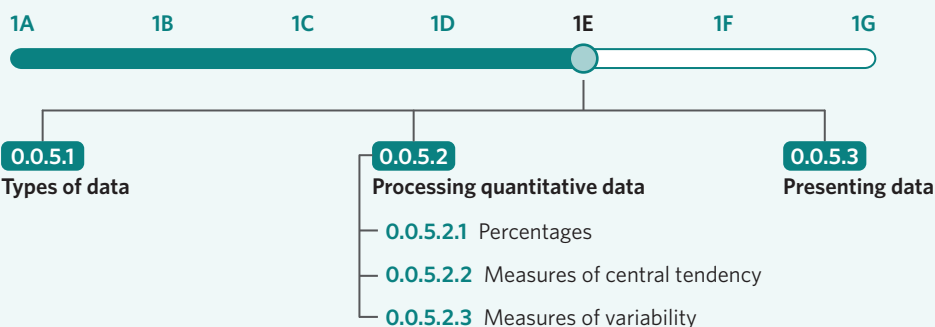
The experimental design being used by Dr Snuff is

- A. within subjects, with group 1 being the experimental group and group 2 the control group.
- B. between subjects, with group 1 being the experimental group and group 2 the control group.
- C. within subjects, with group 1 being the control group and group 2 the experimental group.
- D. between subjects, with group 1 being the control group and group 2 the experimental group.

1E Organising and interpreting data

KEY SCIENCE SKILLS

- Generate, collate and record data
- Analyse and evaluate data and investigation methods
- Analyse, evaluate and communicate scientific ideas



In research, we always talk about the importance of 'data'. The purpose of an experiment, for example, is to generate 'data' that either supports or rejects a hypothesis. But what exactly is data, and what are the different types of data researchers are trying to obtain through experimentation? How do researchers organise, interpret, and communicate their data? In this lesson, you will learn about the different types of data researchers collect and how they may present this data, as well as how they process quantitative (numerical) data.

Types of data 0.0.5.1

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Generate, collate and record data
 - systematically generate and record primary data, and collate secondary data, appropriate to the investigation
 - record and summarise both qualitative and quantitative data, including use of a logbook as an authentication of generated or collated data

There are different types of data researchers collect during investigations.

Theory details

Data refers to any information used as part of or generated by an investigation. Different forms of data can help to answer different kinds of questions, with researchers often aiming to collect different types of data in one investigation. A research finding is more robust when it can be supported by multiple types of data.

In this lesson, you will be learning about different types of data, which are presented in figure 1.

KEY TERMS

Data information used as part of or generated by an investigation

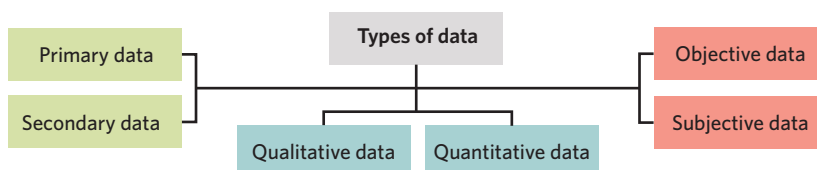


Figure 1 The types of data that you will learn about in this lesson

Primary and secondary data

Primary data refers to data collected first-hand by a researcher. It may be collected in a variety of ways, such as through experimentation, observation, or survey. By contrast, **secondary data** refers to data sourced from others' prior research, not collected directly by the current researcher. Secondary data may be obtained from processes like accessing data from publicly available databases or using data that other researchers have previously collected.

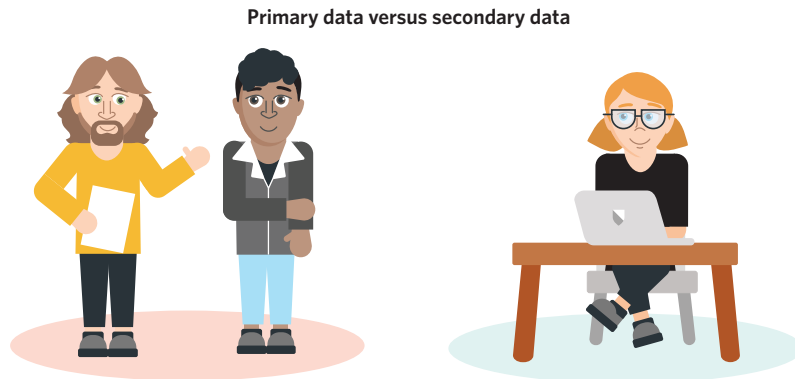


Figure 2 Primary data is sourced first hand by a researcher in their own study, whereas secondary data comes from past research

Quantitative and qualitative data

Quantitative data is data that is expressed numerically, such as test scores or measurements of weight. By contrast, **qualitative data** is data that is expressed non-numerically; for example, a participant's verbal description of how they are feeling. Qualitative data may be collected through methods such as open-ended questionnaires and interviews, while quantitative data may be collected via methods such as close-ended surveys, rating scales, or multiple choice questions. Qualitative data may sometimes be converted into quantitative data using systematic methods and analyses.

Objective and subjective data

Objective data is factual data that is observed and measured independently of personal opinion. Objective data is collected using measurement tools that ensure the same results are obtained by different researchers. Examples of objective data include a person's weight in kilograms or their numerical scores on an intelligence test. These are both forms of objective data as they do not require personal opinion or interpretation by the researcher.

By contrast, **subjective data** is data that is informed by personal opinion, perception, or interpretation. Often, subjective data comes from participants' own qualitative descriptions and self-reports. Subjective data cannot easily be interpreted by a researcher, with subjective measurements unlikely to yield the same results when collected by different researchers. Subjective data can be valuable because it provides rich, qualitative descriptions of personal experience; however, in rigorous research, it is usually combined with and supported by other objective data that is verifiable (able to be shown as accurate).

USEFUL TIP

It's important to know that objective data can be about individuals and their personal thoughts, biological processes, behaviours, and preferences. The difference is that it is just observed and measured without bias or requiring a researcher's interpretation. For example, personal experiences of stress can be measured objectively through scores on a standardised mood test or a combination of physiological measurements like heart rate. They can also be measured subjectively, such as through participants' qualitative descriptions of their recent stressful experiences.

Primary data
data collected first-hand
by a researcher

Secondary data
data sourced from others'
prior research

Quantitative data
data that is expressed
numerically

Qualitative data
data that is expressed
non-numerically

Objective data factual
data that is observed and
measured independently
of personal opinion

Subjective data data that
is informed by personal
opinion, perception, or
interpretation

Processing quantitative data 0.0.5.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- process quantitative data using appropriate mathematical relationships and units, including calculations of percentages, percentage change and measures of central tendencies (mean, median, mode), and demonstrate an understanding of standard deviation as a measure of variability
- identify outliers and contradictory or incomplete data

Before they can draw conclusions, researchers need to summarise, organise, and describe their data to form their results. Part of this includes processing their raw (unprocessed) quantitative data so they can make meaningful comparisons and observations about their results.

Theory details

A rigorous psychological experiment or study may collect a variety of quantitative data. Scores from multiple tests, participants' self-reported ratings on scales and questionnaires, and physiological measurements (like heart rate or blood pressure) may all be forms of quantitative data collected by just one study. When this data is first collected, it is in a raw, unprocessed form. In order to make meaningful comparisons and observations, and notice patterns, a researcher must process all of this numerical information.

Descriptive statistics
statistics that summarise,
organise, and describe data

In scientific research, **descriptive statistics** are statistics that summarise, organise, and describe data. In other words, they process quantitative data in its raw form and allow it to be described further. Before applying descriptive statistics, researchers should account for any missing or incomplete data as this can affect their usefulness and accuracy in summarising data. There are a few methods which can be taken into account for missing or incomplete data depending on what is appropriate for each study, such as deleting the missing or incomplete data cases from the data set.

Examples of descriptive statistics that you will learn about in this lesson are presented in figure 3.

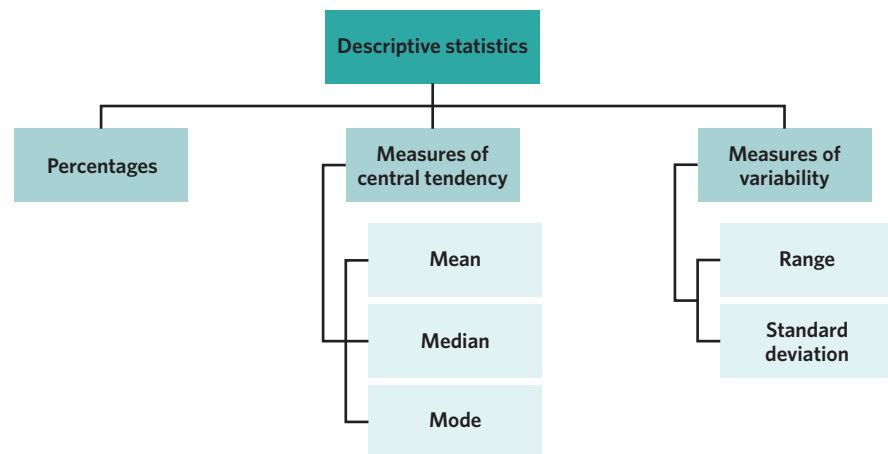


Figure 3 Examples of descriptive statistics in scientific research

WANT TO KNOW MORE?

It is important to understand that descriptive statistics cannot be used to make inferences and draw conclusions about a research population. Rather, descriptive statistics just describe, organise, and summarise a study's data. However, inferential statistics are another type of statistic that is used to make inferences and draw conclusions about whether results are meaningful, significant, and can be generalised to the population of interest.

Percentages 0.0.5.2.1

Percentages are a very common and useful descriptive statistic. By organising results in percentages, researchers can more easily notice patterns and trends, such as the percentage of participants that scored in the high bracket. Percentages are calculated by multiplying the ratio of a total by 100. This could be done using the following steps:

1. Find the total amount of something you want to know as a percentage. For example, if you want to calculate a participant's test scores as a percentage, the total amount would be the number of marks or items on a test. E.g. 30 marks.
2. Divide the given number/score/mark by that total number. E.g. if a participant scored 15 marks out of 30 on the test, you would divide 15 by 30.
3. Multiply that ratio (e.g. $15/30$) by 100 to get your final percentage. E.g. $15/30 \times 100 = 50\%$.

$$\text{Percentage formula} = \frac{\text{given number}}{\text{total number}} \times 100$$

Percentage change

After converting results into percentages, researchers may also wish to know the total percentage change; i.e., how much total percentages increased or decreased. This may be between experimental conditions or groups, or between different participants over time. This allows for comparison of results; for example, it might be helpful to summarise that an experimental group's scores were overall 30% higher than a control group's.

To calculate percentage change, use the following steps.

1. Calculate the difference between the first and second percentage being compared (subtract the new percentage from the old percentage).
2. Divide this difference by the first percentage.
3. Multiply this by 100.

$$\text{Percentage change formula} = \frac{\text{old number} - \text{new number}}{\text{old number}} \times 100$$

If the result is a positive number, this is a percentage increase. If the result is a negative number, this is a percentage decrease.

Measures of central tendency 0.0.5.2.2

Measures of central tendency are descriptive statistics that summarise a data set by describing the centre of the distribution of the data set with a single value. They are useful for researchers as it gives them a good picture of common or standard responses. There are three measures of central tendency that you should know:

- mean
- median
- mode.

Mean

The **mean** is a measure of central tendency that describes the numerical average of a data set, expressed as a single value. It is often referred to as the 'average' of a data set and is calculated by summing (adding up) the total of all data values and then dividing this total by the number of data values in the data set. The mean is helpful because it can tell a researcher what the typical response or score is. However, the mean is more helpful when data values are distributed around a 'centre' (a 'normal distribution'), and is less helpful when data values are widely distributed, in which case the data set is likely to be influenced by extreme values and outliers.

Measures of central tendency descriptive statistics that summarise a data set by describing the centre of the distribution of the data set with a single value

Mean a measure of central tendency that describes the numerical average of a data set, expressed as a single value

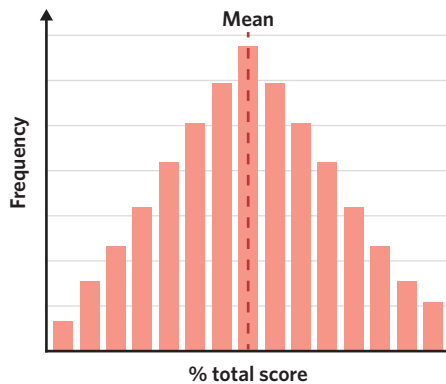


Figure 4 The mean is a very useful measure of the 'average' response in a study when the data set is distributed symmetrically around the centre (i.e. follows a 'normal distribution')

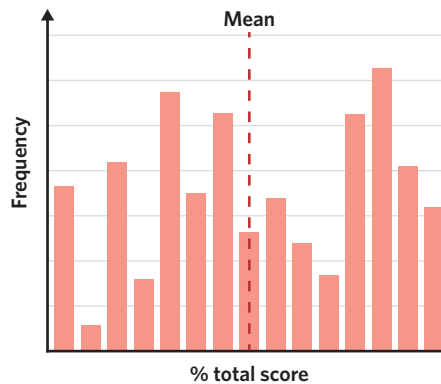


Figure 5 The mean is less indicative of a true common response, even though it is the mathematical average, when a data set is asymmetrical or unevenly distributed

WANT TO KNOW MORE?

When data is evenly or 'normally distributed', it appears in a graph as a symmetrical shape described as a 'bell curve' (shown in figure 4). When data appears as a bell curve, the mean is a more valuable measure of central tendency.

Outlier a value that differs significantly from other values in a data set

Median a measure of central tendency that is the middle value in a data set ordered from lowest to highest

Mode a measure of central tendency that is the most frequently occurring value in a data set

Researchers should be careful to account for **outliers**, or values that differ significantly from other values in a data set, as they make the mean a less accurate summary of the average data value. Outliers can be observed in visual representations of data, in which the outlier may lie far away from the rest of the data points in the data set. Outliers can occur for numerous reasons, including by chance. As a result, outliers are expected to occur more in data sets with a large sample (VCAA). Outliers can also occur due to measurement and recording errors, and could at times negatively impact the validity of research.

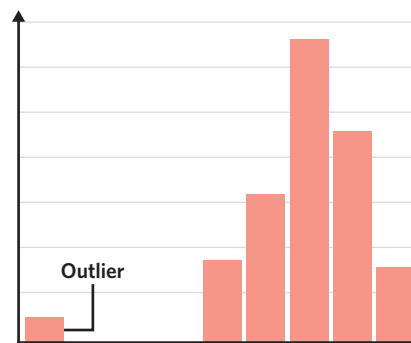


Figure 6 An example of an outlier in a data set (bar chart)

Median

The **median** is a measure of central tendency that is the middle value in a data set ordered from lowest to highest. If there are two central numbers, they are summed (added together) and then divided by two.

The median is useful for researchers to identify a more typical response when the data is not evenly distributed around the centre, or when there are outliers. In such a case, it would be preferable to look at the median instead of the mean to summarise a data set because it is less influenced by outliers or extremely low or high values.

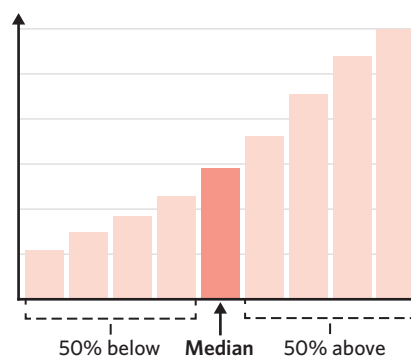


Figure 7 An example of the median value in a data set

Mode

The **mode** is a measure of central tendency that is the most frequently occurring value in a data set. It is the least commonly used measure of central tendency, but is useful for knowing the most common and frequently occurring value. Further, it helps researchers to understand the centre of the data set when the mean or median cannot be calculated.

3 3 5 8 8 8 9 14 19

Figure 8 In the above data set, '8' is the mode because it is the most frequently occurring value

Measures of variability 0.0.5.2.3

Measures of variability are statistics that summarise and describe the spread and distribution of a data set. This can include the difference between data points in a data set, or the difference of a data point from the mean. Measures of variability help indicate how widely participants' responses vary in a data set. There are two measures of variability that you should know:

- range
- standard deviation.

Range

The **range** is a measure of variability that is a value obtained by subtracting the lowest value in a data set from the highest value. The range is used to summarise the overall dispersion (distribution) of scores.

$$3 \quad 7 \quad 7 \quad 8 \quad 9 \quad 12 \quad 14$$

$$14 - 3 = 11$$

Figure 9 The range is a simple calculation of the highest value minus the lowest value to roughly indicate the dispersion of data

Measures of variability statistics that summarise and describe the spread and distribution of a data set

Range a measure of variability that is a value obtained by subtracting the lowest value in a data set from the highest value

Standard deviation a measure of variability, expressed as a value that describes the spread of data around the mean

Standard deviation

The **standard deviation** is a measure of variability, expressed as a value that describes the spread of data around the mean. In other words, the standard deviation number shows how much data 'deviates' from the mean. The higher this value, the greater the data values in the set differ from the mean. Standard deviation is calculated using a mathematical formula. However, you are not expected to know this formula or how to calculate the standard deviation.

The standard deviation is useful for researchers as it shows the dispersion of data, which provides more detailed information about the true nature of a data set compared to the range. This primarily allows for an awareness of the differences in participants' responses. Further, standard deviation allows comparisons to be made between different data sets based on their dispersions. This is not something the mean alone can indicate. Figure 10 shows two data sets with the same mean overlapping. Data set 1 would have a lower standard deviation because its values are clustered more closely around the mean. By contrast, data set 2 would have a higher standard deviation as the data values spread more widely around the mean.

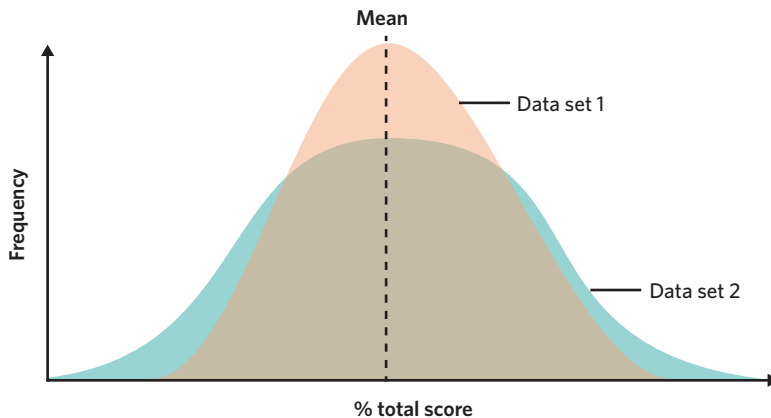


Figure 10 When different data sets have the same mean, the standard deviation can describe how they differ in terms of dispersion

Presenting data 0.0.5.3

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Generate, collate and record data
 - organise and present data in useful and meaningful ways, including tables, bar charts and line graphs
- Analyse, evaluate and communicate scientific ideas
 - use appropriate psychological terminology, representations and conventions, including standard abbreviations, graphing conventions and units of measurement

Presenting data visually allows researchers to summarise and communicate their findings in a highly accessible format.

Theory details

Tables

A **table** is a presentation of data arranged into columns and rows. It helps researchers to organise and summarise their data in a more accessible format, as well as show the relationship between certain variables. Table 1 shows an example of a table from the Australian Bureau of Statistics.

Table 1 An example of a table presenting data (Australian Bureau of Statistics, 2022)

| | Males (%) | Females (%) | Persons (%) |
|-------|-----------|-------------|-------------|
| 16–24 | 31.2 | 46.6 | 39.6 |
| 25–34 | 21.9 | 32.1 | 27.1 |
| 35–44 | 18.5 | 20.7 | 19.7 |
| 45–54 | 16.5 | 24.3 | 21.0 |
| 55–64 | 14.6 | 18.9 | 17.1 |
| 65–74 | 9.5 | 13.1 | 11.4 |
| 75–85 | 2.8 | 4.9 | 3.7 |

Table a presentation of data arranged into columns and rows

Bar chart a graph displaying the relationship between at least two variables using rectangular bars with heights or lengths proportional to the values they represent

Bar charts

A **bar chart** is a graph displaying the relationship between at least two variables using rectangular bars with heights or lengths proportional to the values they represent. They may be displayed horizontally or vertically, but importantly, the bars are of equal width and are separated by space. A bar chart shows the relationship between variables: one axis shows categories of data, while the other shows frequencies or amounts. This helps researchers summarise and communicate their data. When graphs are used to plot the relationship between experimental variables, the independent variable appears on the horizontal axis (x-axis) while the dependent variable appears on the vertical axis (y-axis), or vice versa if the bar chart is displayed vertically.

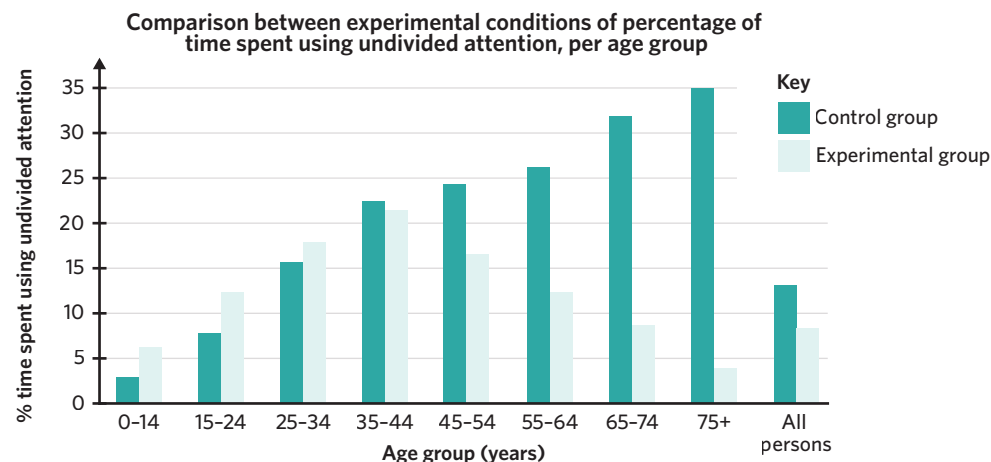


Figure 11 An example of a bar chart

Line graphs

A **line graph** is a graph displaying the relationship between at least two variables using a straight line to connect data points. Line graphs often are used to show data patterns and changes over time. As with bar charts, one axis generally shows categories of data, while the other shows frequencies or amounts.

Line graph a graph displaying the relationship between at least two variables using a straight line to connect data points

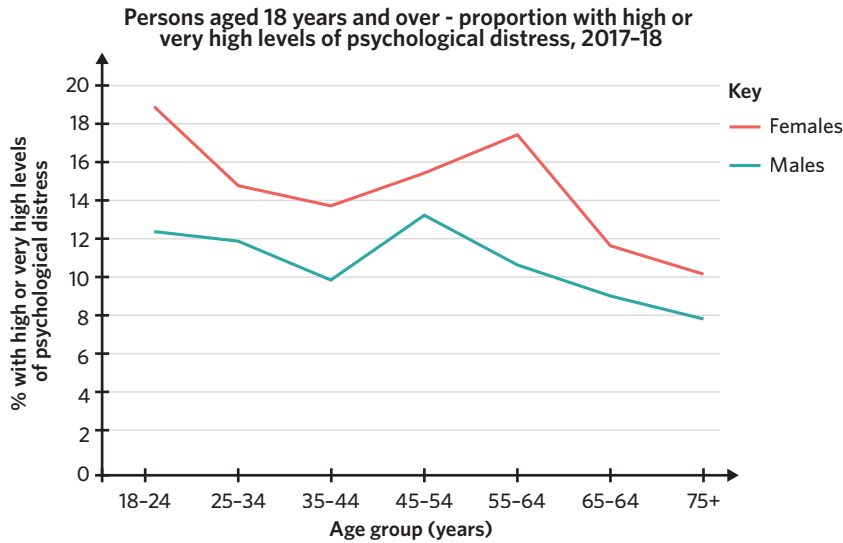


Figure 12 An example of a line graph from the Australian Bureau of Statistics (2018)

Graphing conventions

All graphs should have:

- a title
- the x and y axes labelled with their appropriate variable
- units of measurement labelled on each axis
- if it displays experimental variables, the independent variable should be on the x-axis, while the dependent variable should be on the y-axis.

Theory summary

In this lesson, you learnt about the types of data collected by researchers:

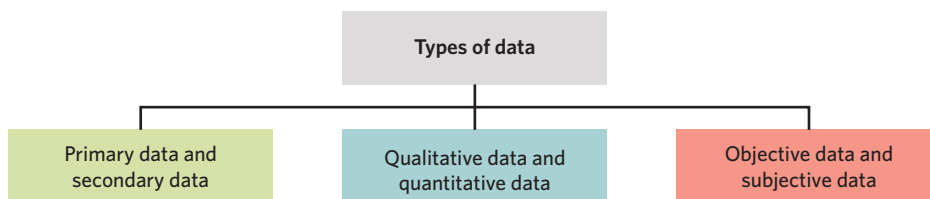


Figure 13 Types of data collected by researchers

You also learnt about different ways of processing and presenting data:

Table 2 Different data tools and their purposes

| Data form | Purpose |
|-----------------------------------|---|
| Percentages and percentage change | <ul style="list-style-type: none"> • Summarise raw data into a meaningful value • Allow for comparisons to be made between data points or sets |
| Mean | <ul style="list-style-type: none"> • Describe the average of a data set • Summarise the typical participant response or data when the data is evenly (normally) distributed |
| Median | <ul style="list-style-type: none"> • Describe the middle value in a data set • Summarise data, especially when the data is not evenly distributed or there are outliers |

Continues ►

Theory summary

Table 2 Continued

| Data form | Purpose |
|--------------------|---|
| Mode | <ul style="list-style-type: none"> Describe the most frequently occurring data value Summarise data, especially when the mean and median cannot be calculated |
| Range | <ul style="list-style-type: none"> Summarise the overall dispersion of scores by describing the difference between the lowest and highest values in a data set |
| Standard deviation | <ul style="list-style-type: none"> Summarise the dispersion of data by describing the spread of data around the mean |
| Table | <ul style="list-style-type: none"> Organise, summarise, and communicate data |
| Bar chart | <ul style="list-style-type: none"> Organise, summarise, and communicate data, especially to show the relationship between variables |
| Line graph | <ul style="list-style-type: none"> Organise, summarise, and communicate data, especially about the relationship between variables over time |

1E Questions

Theory review

Question 1

Generally speaking, a robust finding in psychological research is supported by multiple forms of data.

- A. True.
- B. False.

Question 2

_____ is data from others' past research, whereas _____ is collected first-hand by a researcher in their current research.

Which of the following best fills in the blanks?

- A. Primary data; secondary data
- B. Secondary data; primary data

Question 3

A person's feelings can only be collected in the form of subjective data, not objective data.

- A. True.
- B. False.

Question 4

Raw quantitative data is always easy to understand and interpret.

- A. True.
- B. False.

Question 5

Which of the following are descriptive statistics? **(Select all that apply)**

- I. Measures of central tendency.
- II. Measures of variability.
- III. Percentages.
- IV. Tables and graphs.

Question 6

The _____ is the mathematical average of a data set, whereas the _____ is the middle of a data set that has been ordered from lowest to highest.

Which of the following best fills in the blanks?

- A. mean; median
- B. median; mean

Question 7

Tables, bar charts, and line graphs are useful for **(Select all that apply)**

- I. summarising data.
- II. organising data.
- III. communicating data.
- IV. drawing conclusions from data about the research population.

Assessment skills**Data analysis**

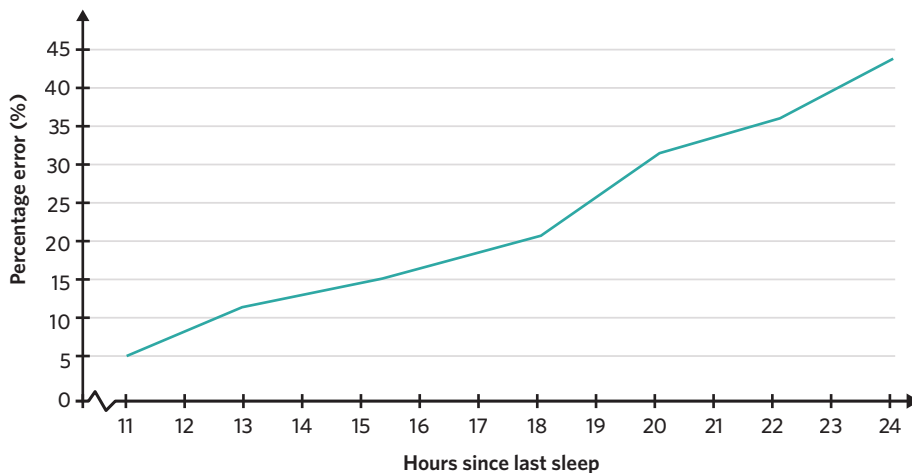
The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 8-10.

Carlos conducted a study on the relationship between sleep deprivation and concentration, as tested through a visual-spatial reasoning test. Greater percentage errors on the test demonstrated poorer visual-spatial reasoning.

The relationship between sleep deprivation and concentration



Adapted from VCAA Psychology exam 2021 Q4

Question 8

What is the name given to this way of displaying data?

- A. Bar chart.
- B. Line graph.
- C. Table.

Question 9

What is the type of data displayed?

- A. Qualitative data.
- B. Quantitative data.

Question 10

Which of the following statements best summarises the data?

- A. As participants' sleep deprivation increases, visual-spatial reasoning abilities decrease.
- B. As participants' sleep deprivation increases, visual-spatial reasoning abilities increase.

Perfect your phrasing**Question 11**

Which of the following sentences is most correct?

- A. Standard deviation describes **the spread of data around** the mean.
- B. Standard deviation describes **how similar all data is to** the mean.

Exam-style**Remember and understand****Question 12** (1 MARK)

Participants' responses on a rating scale from 1 to 5 is an example of which type of data?

- A. Subjective and quantitative.
- B. Objective and quantitative.
- C. Subjective and qualitative.
- D. Objective and qualitative.

Question 13 (1 MARK)

As a measure of variability, standard deviation

- A. describes the differences in a data set, with a higher value indicating a greater spread.
- B. describes the differences in a data set, with a lower value indicating a greater spread.
- C. describes the spread of values around the mean in a data set, with a higher value indicating a greater spread.
- D. describes the spread of values around the mean in a data set, with a lower value indicating a greater spread.

Question 14 (2 MARKS)

List two situations when one should use the median as a measure of central tendency instead of the mean.

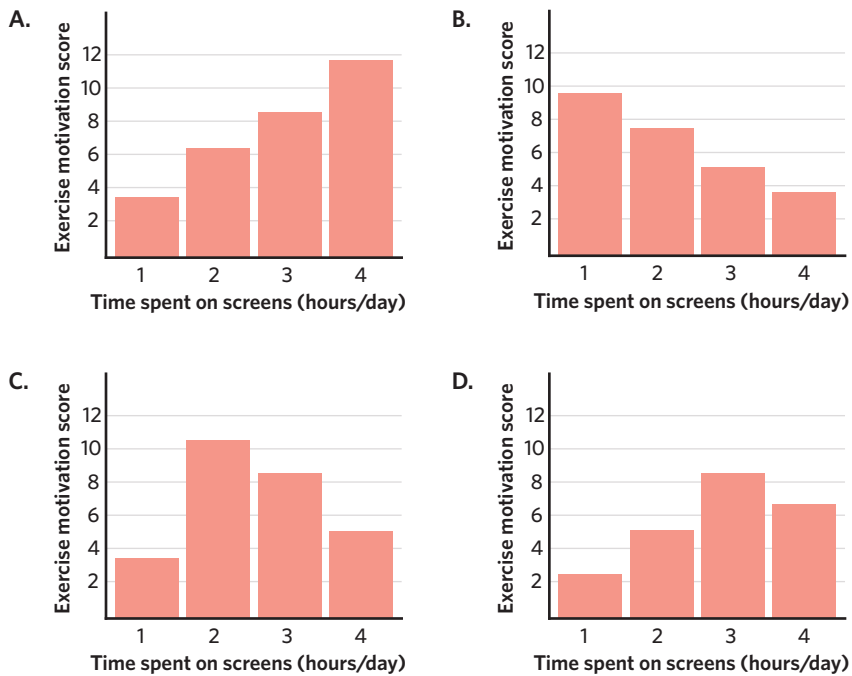
Apply and analyse**Question 15** (1 MARK)

Hester conducted a study on participants' levels of distress after experiencing road accidents. She collected various forms of data, including participants' responses to open-ended interview questions. What type of data is this an example of?

- A. Subjective and quantitative.
- B. Objective and quantitative.
- C. Subjective and qualitative.
- D. Objective and qualitative.

Question 16 (1 MARK)

Murat is a research assistant asked by his head researcher to display their data in a bar chart. Overall, the data shows that as people spend more time on screens, the lower their motivation to exercise. Which of the following bar charts would Murat be most likely to create?

**Question 17** (2 MARKS)

Rhian is processing the data from her study and finds an even, normal distribution of values around the mean. Describe how standard deviation could give Rhian more detail about her data set.

Questions from multiple lessons**Question 18** (1 MARK)

Abdullah hypothesises that reading for half an hour before sleeping will decrease the time it takes to fall asleep. To investigate this, he asks his participants to read for 30 minutes before bed and records how many minutes they take to fall asleep. On the second night, he asks participants to do other things before bed and also records how many minutes they take to fall asleep.

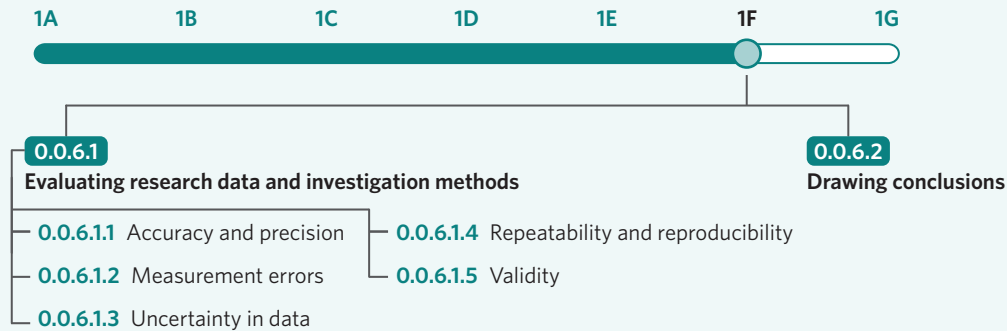
Which of the following identifies the type of data collected and experimental design being used?

| | Type of data | Experimental design |
|----|--------------|---------------------|
| A. | Qualitative | Between subjects |
| B. | Qualitative | Within subjects |
| C. | Quantitative | Between subjects |
| D. | Quantitative | Within subjects |

1F Evaluating research

KEY SCIENCE SKILLS

- Analyse and evaluate data and investigation methods
- Construct evidence-based arguments and draw conclusions



You now know about many of the steps involved in psychological research. However, before researchers can publish their research, they have to evaluate it to ensure it is accurate and of high quality. In this lesson, you will learn about some of the key concepts researchers must consider when evaluating research. You will also learn about how researchers draw conclusions following this evaluation.

Evaluating research data and investigation methods 0.0.6.1

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot points:

- Analyse and evaluate data and investigation methods
 - identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained
- Construct evidence-based arguments and draw conclusions
 - evaluate data to determine the degree to which the evidence supports or refutes the initial prediction or hypothesis

At the end of a study, as you learnt, researchers must process the quantitative data gathered throughout the study. However, they also must evaluate their data and the methods used to obtain their data using a range of key concepts. We will now explore some of these key concepts used to evaluate research data before conclusions can be drawn.

Theory details

After research is conducted and data is organised, researchers must rigorously evaluate their research before conclusions can be drawn. To do this, they use a range of statistical procedures, as well as consider if their research was high quality and free from errors. If there are too many errors, or researchers determine that they did not uphold certain standards in their procedures and methodology, then it is unlikely that conclusions can be drawn from their research and their findings will not be published. The following concepts are important standards and ways researchers can evaluate their study.

Accuracy and precision 0.0.6.1.1

In psychological research, accuracy and precision are concepts used to evaluate the correctness of measurement, and therefore how prone measurements were to error. A simple example of a measurement is measuring weight.

Accuracy refers to how close a measurement is to the true value of the quantity being measured. **True value** refers to the value, or range of values, that would be found if the quantity could be measured perfectly. An accurate measurement of weight, for example, would use a scale that perfectly records an object's weight. An inaccurate measurement of weight might use a poor quality scale that is grams or even kilograms off the true weight of the object measured. In psychology, accuracy is not described numerically; measurement values are simply described as more accurate or less accurate (VCAA).

By contrast, **precision** refers to how closely a set of measurement values agree with each other. Precision gives no indication of how close the measurements are to the true value and is therefore a separate consideration to accuracy. Using the weight example, a precise measurement of weight means that the scale displays the exact same measurement each time the same item is weighed. An imprecise weight measurement would mean that even when weighing the same item, the scale might show different measurements each time.

Importantly, it is possible for a measurement to be accurate but imprecise, and it is also possible for a measurement to be precise but inaccurate. This is demonstrated in figure 1. Taking a dartboard as a metaphor, an accurate measurement should hit the bullseye; i.e., hit (measure) what it is supposed to. A precise measurement would hit the same place each time, regardless of how close it is to the bullseye.

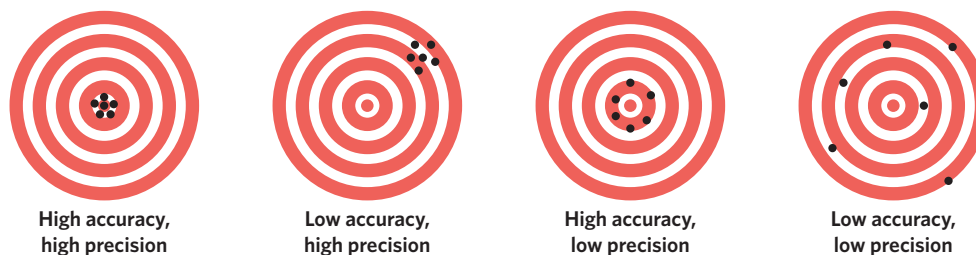


Figure 1 Accuracy and precision are distinct concepts used by scientists to think about errors in measurement

Measurement errors 0.0.6.1.2

In lesson 1D, you learnt about all the types of experimental errors that should be accounted for to prevent the occurrence of extraneous and confounding variables. However, there are other types of errors that can occur in psychological research when taking measurements; these are known as systematic errors and random errors.

Systematic errors

Systematic errors are errors in data that differ from the true value by a consistent amount. For example, systematic errors from a scale may mean that readings are consistently 100 grams lighter than the true value of an object's weight. The consistency or 'systematicness' of an error means that repeating measurements will not improve them (VCAA). Instead, researchers should be aware of the systematic error occurring and account for it, or if it is their error, become more practised with the measurement tool. The presence of systematic errors means the accuracy of measurement is affected (VCAA).

Systematic errors may occur due to:

- environmental factors
- observational/researcher error
- incorrect measurement instrument calibration (VCAA).

Random errors

Random errors are errors in data that are unsystematic and occur due to chance. While random errors also result in measurements that differ from the true value, they do not occur in a consistent way like systematic errors. For example, a random error may be a scale that weighs the same object and shows different, unpredictable readings each time. The presence of random errors means the precision of measurement is affected (VCAA).

KEY TERMS

Accuracy how close a measurement is to the true value of the quantity being measured

True value the value, or range of values, that would be found if the quantity could be measured perfectly

Precision how closely a set of measurement values agree with each other

Systematic errors errors in data that differ from the true value by a consistent amount

Random errors errors in data that are unsystematic and occur due to chance

Random errors may occur due to:

- poorly controlled or varying measurement procedures
- imperfect or faulty measurement tools, e.g. a scale that is running out of battery
- variations in measurement contexts, including differences between participants and environmental differences. For example, taking a measurement of participants' concentration at night might result in a different measurement of that same variable taken in the morning.

Random errors may be reduced by:

- repeating and conducting more measurements
- calibrating measurement tools correctly
- refining measurement procedures
- controlling any other extraneous variables
- increasing the sample size of participants (VCAA).

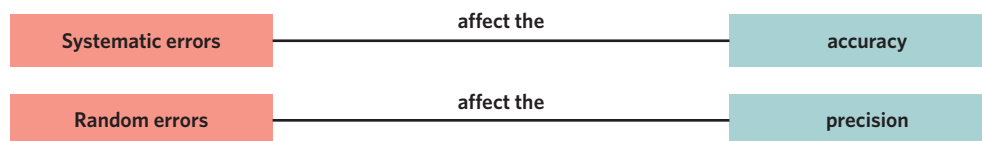


Figure 2 Summary of the relationship between accuracy and precision, and systematic and random errors

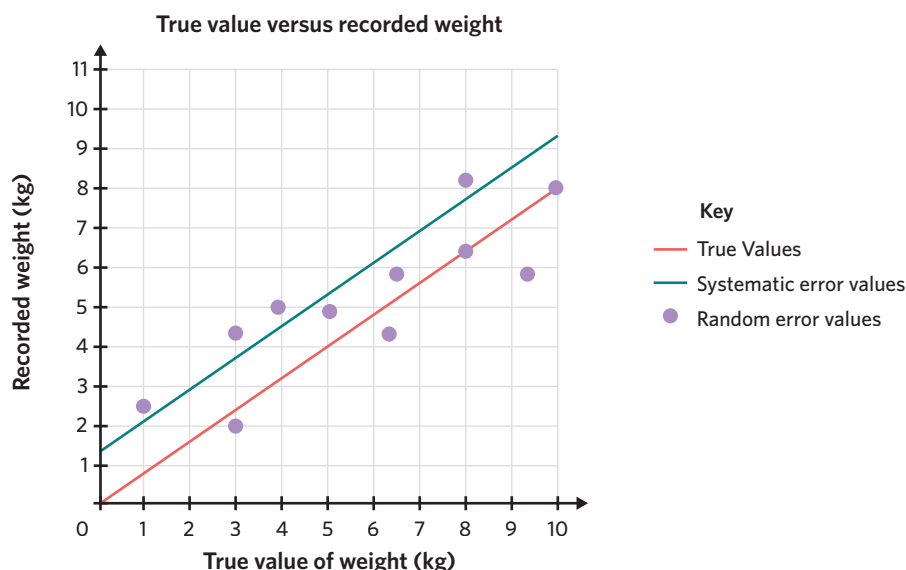


Figure 3 An example of what systematic and random errors from a scale might look like when graphed

Uncertainty the lack of exact knowledge relating to something being measured due to potential sources of variation in knowledge

Uncertainty in data 0.0.6.1.3

While we might aim to obtain a ‘true value’ of height or weight, the ‘true value’ of stress, happiness, or concentration is harder to define. Humans have developed very precise ways of measuring some things, such as millimetres, but not all psychological phenomena are so easy to measure with certainty. **Uncertainty** refers to the lack of exact knowledge relating to something being measured due to potential sources of variation in knowledge. For example, a study may aim to test ‘positive mood’ and use a range of measures that attempt to assess it. However, given the blurred boundaries of what ‘positive mood’ truly is, researchers would still have some uncertainty in its assessment. The uncertainty of measurement reflects the lack of exact knowledge regarding the true value and less quantifiable nature of what is being measured.

Part of evaluating research data in psychology involves acknowledging and accounting for this uncertainty. This can involve a range of approaches, such as suggestions for future research and what later iterations of research might target to make findings more robust.

Repeatability and reproducibility 0.0.6.1.4

One way of evaluating psychological findings and investigations as a whole is using the concepts of repeatability and reproducibility. Given psychology's strict adherence to a scientific method and iterative nature, particularly hypothesis testing and re-testing, it is extremely important that psychological experiments are able to be repeated. This ensures that any findings are not one-off anomalies and can be confirmed or expanded upon by future research. A scientific finding or study that is both repeatable and reproducible is considered stronger.

Repeatability

Repeatability is the extent to which successive measurements or studies produce the same results when carried out under identical conditions within a short period of time (e.g. same procedure, observer, instrument, instructions, and setting). In short, repeatability is the extent to which the same study or measure used under the same conditions will produce the same results.

Reproducibility

Reproducibility is the extent to which successive measurements or studies produce the same results when repeated under different conditions (e.g. different participants, time, observer, and/or environmental conditions). In other words, reproducibility may be thought of as the extent to which the same study or measure, used under different conditions or with different people or procedures, will produce the same results.

Repeatability the extent to which successive measurements or studies produce the same results when carried out under identical conditions within a short period of time (e.g. same procedure, observer, instrument, instructions, and setting)

Reproducibility the extent to which successive measurements or studies produce the same results when repeated under different conditions (e.g. different participants, time, observer, and/or environmental conditions)

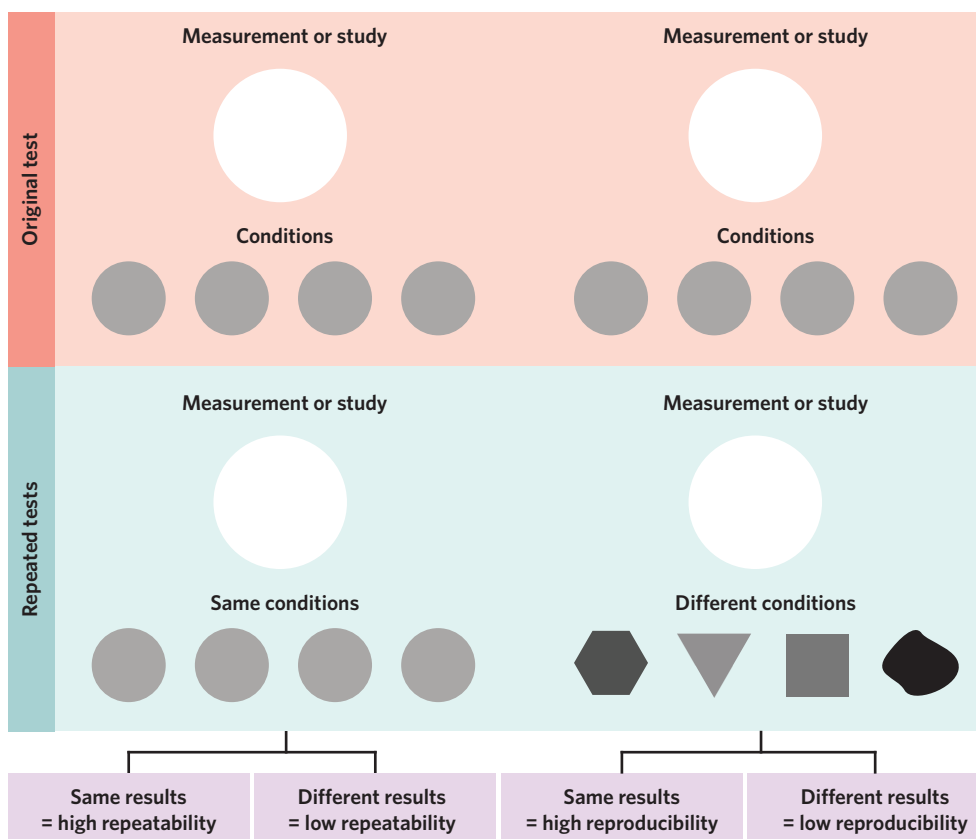


Figure 4 Conceptual diagram of the difference between repeatability and reproducibility

WANT TO KNOW MORE?

Another consideration of psychological research is reliability. Reliability refers to the extent to which a study or specific measure produces consistent results. This includes consistency over time, across individual test items, and between different researchers.

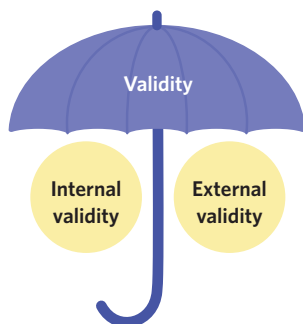


Figure 5 Validity is an umbrella term, under which are the concepts of internal validity and external validity

Validity the extent to which psychological tools and investigations truly support their findings or conclusions

Internal validity the extent to which an investigation truly measures or investigates what it claims to

External validity the extent to which the results of an investigation can be applied to similar individuals in different settings

PSYCHOLOGY EXPLORATION

Although rigorous scientific methods are a supposed hallmark of psychology, the discipline has suffered from the 'replication crisis'. The replication crisis is an ongoing and broad problem some sciences face, including psychology. It refers to the phenomenon that some reported results are challenging or impossible to reproduce, or have been supported by poor quality statistical procedures. As such, the credibility of many findings have been called into question.

Since this problem was first raised, scientists, including psychologists, have sought to reform particular practices to rectify conditions that have led to this crisis. For example, the 'Open science' movement has advocated for 'pre-registration'. Here, psychologists are encouraged to pre-upload their hypotheses and methods for approval from peers. It can be considered like a pre-peer review. Additionally, the encouragement of data-sharing means that psychologists are less likely to manipulate data for outcomes that may support their hypotheses.

Validity 0.0.6.1.5

Validity refers to the extent to which psychological tools and investigations truly support their findings or conclusions. Validity as a concept may be applied to evaluate a specific measurement tool or to an investigation as a whole. A valid measure is one that measures what it intends to measure. When evaluating an investigation, there are two distinct types of validity: internal validity and external validity.

Internal validity

Internal validity is the extent to which an investigation truly measures or investigates what it claims to. If internal validity is lacking, then the results of an investigation may not be true and a conclusion cannot be drawn. Researchers should consider the following points if they are to achieve internal validity:

- the adequacy of measurement tools and procedures. Do they test what they claim to?
- the adequacy of the experimental design. Did it minimise extraneous variables?
- the adequacy of sampling and allocation procedures. Was the sample and its allocation representative and unbiased?
- whether the independent variable truly affected the dependent variable. Were there confounding or extraneous variables?

LESSON LINK

In lesson **1D Preventing error and bias**, you learnt about extraneous and confounding variables. Controlling these types of experimental errors helps to ensure that internal validity is not compromised. This is because the presence of these variables means that variables other than the independent variable may impact the dependent variable, and there are alternative explanations for results.

External validity

External validity is only considered when internal validity is present. **External validity** is the extent to which the results of an investigation can be applied to similar individuals in different settings (VCAA). This different setting could be a different time (e.g. repeating an investigation later) or a different environment.

External validity can be improved by:

- using sampling procedures that create a more representative sample; i.e. more similar to people in the real world.
- having broad inclusion criteria (characteristics of people in the sample); i.e. having a diverse range of people in the sample, including culturally, again so it is more representative of people in the real world.
- using a larger sample size, which makes it more likely to be representative of the population.

WANT TO KNOW MORE?

Having a culturally-diverse sample is very important to knowing whether the findings of a study can be applied to most people in the real world, and not just a specific cultural group. In the past, a lot of psychological research was conducted using predominantly WEIRD (Western, educated, industrialised, rich and democratic) research participants. Modern research by Joseph Heinrich and others found that a lot of these past findings did not reflect the behaviours of non-WEIRD people, who make up the vast majority of the world's population. In other words, a lot of psychological research had limited external validity. Although contemporary psychology is aiming to rectify this by increasing cultural diversity in studies, this highlights the need to consider whether a study's sample will truly enable valid findings.

Table 1 Summary of the difference between internal and external validity

| | Internal validity | External validity |
|-----------------------|---|---|
| Key question | Did the study truly measure what it claimed to? | Can the study's results be applied to similar people in other contexts? |
| Area of consideration | Inside the present study | Beyond the present study |

LESSON LINK

In lesson **1C Population, sample, and sampling**, you learnt about the idea of generalisability. Generalisability is another key concept that refers to the extent to which findings from a sample may be applied to the broader population. Generalisability is very similar to external validity in that if there is high generalisability, there is also high external validity. This is because for both to exist, findings can be applied to other settings. Imagine a study on the effectiveness of a particular study technique for helping to remember information; this method would be said to have high generalisability if it was effective with a wide range of people in the real world, e.g. adults, children, men, and women. As with external validity, generalisability is increased with a larger and more representative sample.

Drawing conclusions 0.0.6.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Construct evidence-based arguments and draw conclusions
 - evaluate data to determine the degree to which the evidence supports or refutes the initial prediction or hypothesis
 - identify, describe and explain the limitations of conclusions, including identification of further evidence required
 - evaluate data to determine the degree to which the evidence supports the aim of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation

After using the methods of evaluation we have discussed to check if their research is of high quality, researchers are more equipped to draw a valid conclusion for their study.

Theory details

In psychological research, a **conclusion** is a statement that summarises the findings of a study, including whether the hypothesis was supported or rejected. The term conclusion may also refer to the final section of a written report or article in psychology that summarises the findings and makes final recommendations for future research. Table 2 outlines what should be considered when making conclusions and strategies researchers may use for each.

Conclusion a statement that summarises the findings of a study, including whether the hypothesis was supported or rejected

LESSON LINK

In lesson **1A Introduction to research**, you learnt about why psychology is a science. It is important that conclusions do not state that something was 'proved' or 'disproved', as this goes against the iterative nature of psychology as a science that is open to testing, retesting, and review. Instead, a conclusion should simply state whether the hypothesis was supported or rejected within the confines of the present study.

Table 2 Important considerations when drawing conclusions in psychological research

| Consideration | Questions to consider |
|--|---|
| The extent to which the data (evidence) supports or rejects the hypothesis | <ul style="list-style-type: none"> • What did the data and statistics (descriptive and inferential) reveal? Does it support or reject the hypothesis? • Was the data set complete or did it exclude important information? • Were accuracy, precision, repeatability, reproducibility, validity, errors, and the certainty of data ensured? |
| Whether further evidence is required | <ul style="list-style-type: none"> • What did the data and statistics (descriptive and inferential) reveal? • Was the data set complete or did it exclude important information? • Were accuracy, precision, repeatability, reproducibility, validity, errors, and the certainty of data ensured? • Was the aim of the study met? Why or why not? |
| Whether there are clear recommendations for further studies | <ul style="list-style-type: none"> • What might future studies do to make the present findings more robust? • What modifications to the present study could make its findings more robust? For example, should it be conducted again using a different sample, under different conditions, or using an alternative method or measurement tool? • If accuracy, precision, repeatability, reproducibility, validity, errors, and the certainty of data were not ensured, how might they be? • If there were extraneous and confounding variables, how could they be controlled for? |

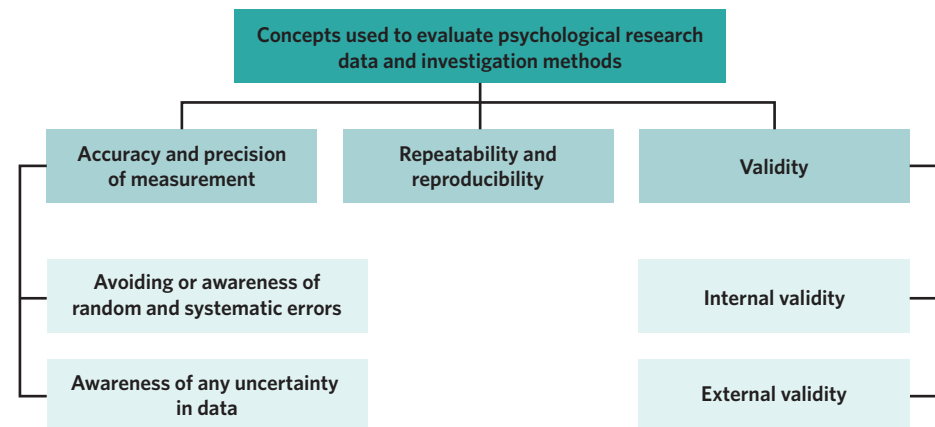
WANT TO KNOW MORE?

In real-world psychological investigations, conclusions must be based on inferential statistics. Unlike descriptive statistics, which merely summarise the data, inferential statistics help researchers to 'infer' and make conclusions about the research population.

Inferential statistics enable researchers to comment on the statistical significance of their results; i.e. how likely the results were truly due to the causal relationship between variables, as opposed to chance or randomness. This judgement is derived from a specific type of inferential statistic known as the p-value.

Theory summary

In this lesson, you have learnt what a conclusion is in psychological research. You have also learnt about some very important concepts researchers use to evaluate the quality of their research procedures and the data they collect before making conclusions.

**Figure 6** Summary of lesson 1F

1F Questions

Theory review

Question 1

After researchers process their quantitative data, they are ready to make a conclusion.

- A. True.
- B. False.

Question 2

A conclusion is

- A. a summary of results that states whether the aim was met.
- B. a summary of results that states whether the hypothesis was supported or refuted.

Question 3

Which of the following are important concepts researchers should apply when evaluating their research?

(Select all that apply)

- I. Validity.
- II. Reproducibility.
- III. Repeatability.
- IV. Conclusivity.
- V. True value.

Question 4

_____ assesses whether a study investigated what it intended to measure, whereas _____ assesses whether a study's results can be applied to similar individuals in different settings.

Which of the following best fills in the blanks?

- A. Internal validity; external validity
- B. External validity; internal validity

Question 5

_____ is affected when there are random errors, whereas _____ is affected when there are systematic errors.

Which of the following best fills in the blanks?

- A. Precision; accuracy
- B. Accuracy; precision

Question 6

If researchers are very careful and use rigorous methods, they can produce findings with certainty.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 7

Validity is

- A. the degree to which psychological tools, findings, and studies **are factual**.
- B. the degree to which psychological tools, findings, and studies **truly support their findings**.

Question 8

Accuracy is

- A. how closely a measurement is to the **real value** of what is being measured.
- B. how closely a measurement is to the **true value** of what is being measured.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 9

Which of the following is a similarity between external validity and reproducibility?

- A. They both concern whether a test or study will produce the same results when conducted again in another setting.
- B. They both concern whether a test or study will produce the same results when conducted again in the same setting.

Question 10

Which of the following is a similarity between random and systematic errors? **(Select all that apply)**

- I. They both occur due to chance.
- II. They both result in measurements that are off the true value of what is being measured.
- III. They both can occur due to observational error.
- IV. They can both occur due to the measurement instrument.

Question 11

Which of the following is a similarity between internal and external validity?

- A. They can both be increased with a more representative sample.
- B. They both concern whether results can be extended to the wider population.

Exam-style

Remember and understand

Question 12 (1 MARK)

The presence of confounding variables most directly affects

- A. external validity.
- B. internal validity.
- C. reproducibility.
- D. repeatability.

Question 13 (2 MARKS)

Compare repeatability and reproducibility.

Apply and analyse

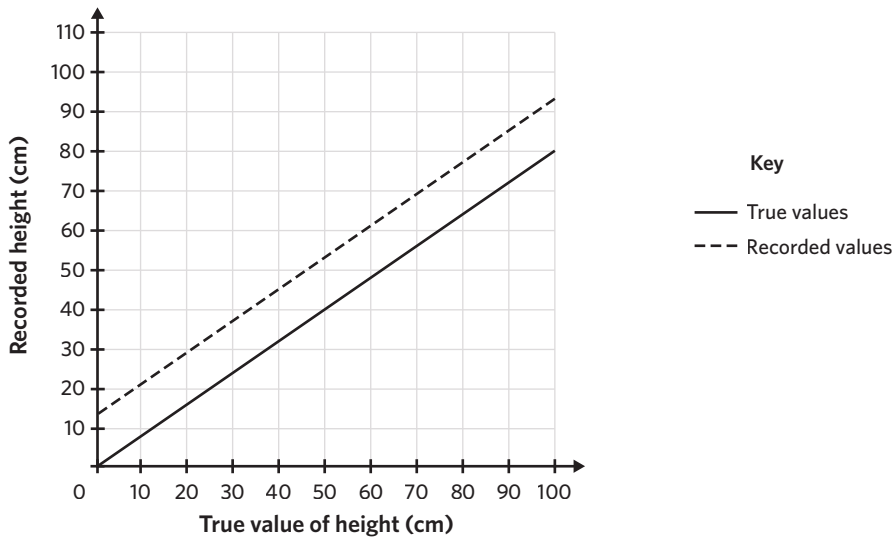
Question 14 (1 MARK)

A measurement tool that consistently predicts intelligence amongst children, adolescents, and adults is likely to have

- A. high repeatability.
- B. high reproducibility.
- C. high validity.
- D. high precision.

Use the following information to answer questions 15 and 16.

Doctor Juan was conducting a study on the relationship between height and dating confidence amongst 18 to 25-year-old males. The true value of the men's heights were recorded, as well as Doctor Juan's own corresponding recordings of these heights, is plotted on the graph below.



Question 15 (1 MARK)

This graph reveals that Doctor Juan's recording of participants' height was

- A. precise and accurate.
- B. accurate, but not precise.
- C. precise, but not accurate.
- D. neither accurate nor precise.

Question 16 (1 MARK)

Which of the following is the type of error in Doctor Juan's study and a possible strategy Doctor Juan could use to reduce such errors?

- A. random errors and by ensuring there are no participant-related extraneous variables.
- B. random errors and by recalibrating his measurement instrument.
- C. systematic errors and by ensuring there are no participant-related extraneous variables.
- D. systematic errors and by recalibrating his measurement instrument.

Question 17 (4 MARKS)

Stefan conducted a study to test whether a new running technique increased runners' speed. When he used the technique with his sample of participants, he found that it increased their speed each time. However, after the study, his colleague tested the same technique with another group of similar runners, but in a different city, and found that it was ineffective.

With reference to repeatability and reproducibility, outline one strength and one weakness of Stefan's study.

Questions from multiple lessons

Question 18 (3 MARKS)

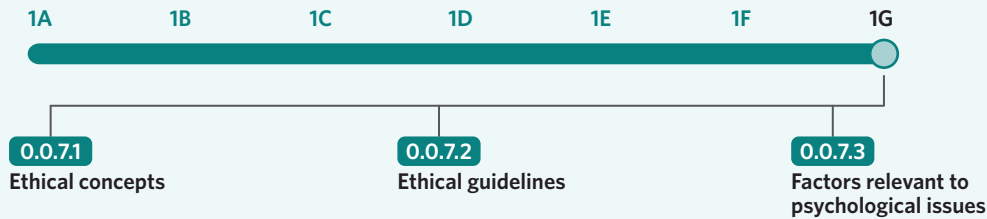
Maria conducted a study on beach volleyball players' levels of anxiety prior to games. Maria wished to investigate whether higher levels of pre-game anxiety improved performance. After completing her research, Maria discovered that all the games she conducted testing in were practice matches performed on players' home courts.

Identify and explain how an extraneous variable may have affected Maria's ability to draw a valid conclusion.

1G Ethical considerations

KEY SCIENCE SKILLS

- Comply with safety and ethical guidelines



Is it okay to test a brand new drug, the risk of which is not yet known, on humans or animals? What if this drug could potentially save the lives of millions? Is it okay to record people without them knowing if it might help researchers to answer questions that could improve the state of modern schooling, or the way parents look after their children? And what about lying: is it okay to lie to people about why they are being asked a series of highly personal questions? What if they are told the truth later? All of these considerations concern ethics, which is a branch of knowledge and ideas that are concerned with what is morally right or wrong.

In this lesson, you will learn about the ethical concepts and guidelines that must be kept in mind when conducting research in the field of psychology.



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Ethical concepts 0.0.7.1

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Comply with safety and ethical guidelines
 - demonstrate ethical conduct and apply ethical guidelines when undertaking and reporting investigations

Ethical concepts are the moral guiding principles that should be followed and considered when doing psychological research, practice, or examining a psychological issue.

Theory details

Imagine you are in a crowded shopping centre on the weekend. As you are strolling around, concentrating on finding your way, a person comes from behind you and steals your bag, threatening to physically hurt you if you try to get it back. They run off.

You're quite shaken up by this event and take a seat to collect yourself. Eventually, you pull yourself together, still feeling fairly anxious, and leave the shopping centre. On your way out, a person stops you and pulls you aside revealing that you have been a participant in a study on people's fear reactions in crowded versus non-crowded environments. They ask you to subsequently fill out a survey.

How do you feel? You may feel a sense of anger or betrayal: how could people, without your permission, make you feel so distressed? Someone could have gotten hurt! Was that study really fair? Honest? Worth the harm it caused? All of these considerations are examples of ethical concepts.

KEY TERMS

Ethical concepts

the broad, moral guiding principles that people should consider when conducting research, practising psychology, or when analysing a psychological issue or debate

In psychology, **ethical concepts** refer to the broad, moral guiding principles that people should consider when conducting research, practising psychology, or when analysing a psychological issue or debate. In contrast to ethical guidelines, ethical concepts are not prescribed by a specific rulebook, body or organisation. Instead, they are just general principles that can help researchers and students of psychology act and think in a more morally-conscious way. Some ethical concepts you may be familiar with include:

- beneficence
- integrity
- justice
- non-maleficence
- respect.

These concepts are displayed in figure 1 and will be described in table 1.

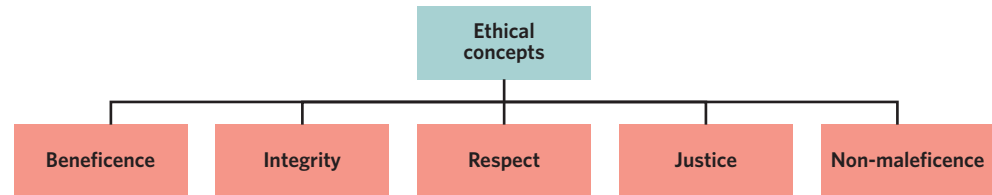


Figure 1 Ethical concepts relevant to psychology

Table 1 Ethical concepts in psychology

| Ethical concept | Definition | Relevant considerations |
|--------------------|--|---|
| Beneficence | Beneficence refers to the commitment to maximising benefits and minimising the risks and harms involved in taking a particular position or course of action (VCAA). | Some considerations related to beneficence include: <ul style="list-style-type: none"> • whether the research design minimises harm. • where harm is a necessary part of the research, it is outweighed by the merits (benefits) of the study. • participants' welfare. |
| Integrity | Integrity is the commitment to searching for knowledge and understanding, and the honest reporting of all sources of information and results, whether favourable or unfavourable, in ways that permit scrutiny and contribute to public knowledge and understanding (VCAA). | Some considerations related to integrity include: <ul style="list-style-type: none"> • objective and open reporting and recording of results. • processes of peer review. • thoroughness of any literature review and other research procedures. |
| Justice | Justice in research is the moral obligation to ensure that there is fair consideration of competing claims; that there is no unfair burden on a particular group from an action; and that there is fair distribution and access to the benefits of an action (VCAA). | Some considerations related to justice include: <ul style="list-style-type: none"> • objectivity in evaluating results. • ensuring the research design and suggestions on the basis of conclusions are not discriminatory against certain groups. • ensuring psychological practice does not stereotype or discriminate. • equity in access to psychological services and findings. |

Continues ►

Beneficence

the commitment to maximising benefits and minimising the risks and harms involved in taking a particular position or course of action

Integrity the commitment to searching for knowledge and understanding, and the honest reporting of all sources of information and results, whether favourable or unfavourable, in ways that permit scrutiny and contribute to public knowledge and understanding

Justice the moral obligation to ensure that there is fair consideration of competing claims; that there is no unfair burden on a particular group from an action; and that there is fair distribution and access to the benefits of an action

Table 1 Continued

| Ethical concept | Definition | Relevant considerations |
|------------------------|--|--|
| Non-maleficence | Non-maleficence is the principle of avoiding causing harm. However, as a position or course of action may involve some degree of harm, the concept of non-maleficence implies that the harm resulting from any position or course of action should not be disproportionate to the benefits from any position or course of action (VCAA). | Some considerations related to non-maleficence include: <ul style="list-style-type: none"> designing research to minimise psychological and physical harm. participants' welfare. cost-benefit analyses of whether benefits outweigh the risks. |
| Respect | Respect is the consideration of the extent to which living things have an intrinsic value and/or instrumental value; giving due regard to the welfare, liberty and autonomy, beliefs, perceptions, customs and cultural heritage of both the individual and the collective; consideration of the capacity of living things to make their own decisions; and when living things have diminished capacity to make their own decisions, ensuring that they are empowered where possible and protected as necessary (VCAA). | Some considerations related to respect include: <ul style="list-style-type: none"> respect for and consideration of the welfare of human and non-human research participants. protection of participants' autonomy. respect for individuals' personal beliefs and cultures. |

Non-maleficence (also known as the no-harm principle) the principle of avoiding causing harm

Respect the consideration of the extent to which living things have an intrinsic value and/or instrumental value; giving due regard to the welfare, liberty and autonomy, beliefs, perceptions, customs and cultural heritage of both the individual and the collective; consideration of the capacity of living things to make their own decisions; and when living things have diminished capacity to make their own decisions, ensuring that they are empowered where possible and protected as necessary

Ethical guidelines 0.0.7.2

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Comply with safety and ethical guidelines
 - demonstrate ethical conduct and apply ethical guidelines when undertaking and reporting investigations

Ethical guidelines refer to the rights participants are entitled to in research and that researchers must ensure are provided.

Theory details

Although general ethical concepts are very important to keep in mind, there is also a set of ethical guidelines researchers must consider and follow when conducting investigations. In VCE Psychology, **ethical guidelines** include the procedures and principles used to ensure that participants are safe and respected. When you evaluate research yourself, you should consider whether these guidelines have been followed.

Ethical guidelines (also known as participants' rights) the procedures and principles used to ensure that participants are safe and respected

WANT TO KNOW MORE?

Where do ethical guidelines come from? In Australia, the Australian Psychological Society has developed a Code of Ethics that all psychologists must follow, and a set of accompanying guidelines. This has been used as the code for Australian psychology since 2010, when it was adopted by the Psychology Board of Australia.

This Code of Ethics has the same guidelines as the National Statement on Ethical Conduct in Human Research (last updated in 2018). This statement was issued by the National Health and Medical Research Council (NHMRC), which is a governmental body responsible for research guidelines.

Importantly, there are also specific guidelines that must be followed when working with Aboriginal and Torres Strait Islander Peoples and communities, including:

- Ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and communities: Guidelines for researchers and stakeholders (NHMRC)
- Code of Ethics for Aboriginal and Torres Strait Islander Research (Australian Institute of Aboriginal and Torres Strait Islander Studies).

Confidentiality the privacy, protection and security of a participant's personal information in terms of personal details and the anonymity of individual results, including the removal of identifying elements

Informed consent procedures processes that ensure participants understand the nature and purpose of the experiment, including potential risks (both physical and psychological), before agreeing to participate in the study

Deception the act of intentionally misleading participants about the true nature of a study or procedure

Debriefing a procedure that ensures that, at the end of the experiment, the participant leaves understanding the experimental aim, results and conclusions

Before any psychological research begins, it must be approved by an ethics committee that ensures the study is designed in a way that meets ethical standards. We will now look at the following ethical guidelines, which may also be considered as participants' rights in research:

- confidentiality
- informed consent procedures
- use of deception
- debriefing
- voluntary participation
- withdrawal rights.

Participants should be made aware of their rights at the beginning of a study. It is the role of researchers to ensure that these guidelines are upheld. These ethical guidelines are displayed in figure 2 and explained in table 2.

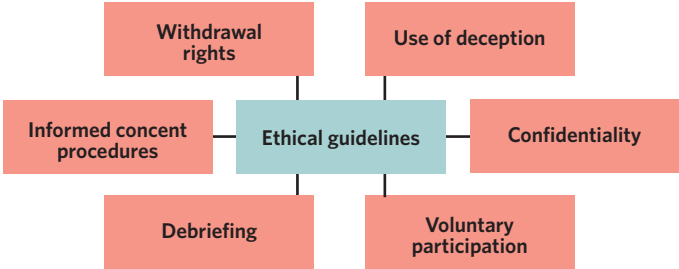


Figure 2 Ethical guidelines in psychology

Table 2 Ethical guidelines and participants' rights in research

| Ethical guideline | Definition | Ways this guideline may be ensured |
|------------------------------------|---|--|
| Confidentiality | Confidentiality refers to the privacy, protection and security of a participant's personal information in terms of personal details and the anonymity of individual results, including the removal of identifying elements (VCAA). | <ul style="list-style-type: none"> • Having data storage tools and procedures that are safe and secure. • Anonymising participants' results when sharing or publishing them. |
| Informed consent procedures | Informed consent procedures are processes that ensure participants understand the nature and purpose of the experiment, including potential risks (both physical and psychological), before agreeing to participate in the study (VCAA). | <ul style="list-style-type: none"> • Voluntary written consent should be obtained by the experimenter. If participants are unable to give this consent, then a parent or legal guardian should provide this (VCAA). • Participants under 18 must have their parents or guardians give consent. Participants should give consent as well where possible. • Participants who for other reasons, such as disability, cannot give consent, must also have someone give consent on their behalf. |

Continues ►

Table 2 Continued

| Ethical guideline | Definition | Ways this guideline may be ensured |
|--------------------------------|--|---|
| Use of deception | <p>Deception refers to the act of intentionally misleading participants about the true nature of a study or procedure.</p> <p>Deception is only permissible when participants' knowledge of the true purpose of the experiment may affect their behaviour while participating in the study, and the subsequent validity of the experiment (VCAA). It should only be used when necessary. For example, a study may use a confederate (research actor) that acts as though they need help in order to record participants' responses to such a situation. Knowing the confederate is acting would impact the validity of the results.</p> | <ul style="list-style-type: none"> • The possibility that deception may be used must be outlined in the consent form. • Any deception used during research must be fully explained at the conclusion of the study. • Participants' questions should be answered at the conclusion of a study. |
| Debriefing | <p>Debriefing is a procedure that ensures that, at the end of the experiment, the participant leaves understanding the experimental aim, results and conclusions (VCAA). Debriefing must be conducted at the end of every study.</p> | <ul style="list-style-type: none"> • Participants' questions should be answered at the conclusion of a study. • Support should be offered to participants to address any harm from the study. • Debriefing must occur at the conclusion of the study and participants must be told about any deception. |
| Voluntary participation | <p>Voluntary participation is a principle that ensures there is no coercion or pressure put on the participant to partake in an experiment, and they freely choose to be involved (VCAA).</p> | <ul style="list-style-type: none"> • In order to have true voluntary participation, there must also be informed consent. • Participants must not be coerced, but rewards for participation are permitted. However, there can be no negative consequences if a participant does not agree to participate. |
| Withdrawal rights | <p>Withdrawal rights refer to the right of participants to be able to discontinue their involvement in an experiment at any time during, or after the conclusion of, an experiment without penalty (VCAA).</p> | <ul style="list-style-type: none"> • Participants' results should be removed from the study if they wish to withdraw at any point, even after the conclusion of the study. • Participants should not be coerced in any way to remain in the study. • Any compensation offered for time spent at the beginning of the study should still be offered to participants who withdraw. |

WANT TO KNOW MORE?

In lesson **1D Preventing error and bias**, you learnt about the use of placebos in studies to serve as a comparative baseline. There are certain ethics surrounding the use of placebo medication in psychological research including:

- **Informed consent:** participants must be made aware that they could be allocated to an experimental condition in which they may receive a placebo. They must also be told about any potential negative side effects of taking a placebo.
- **Voluntary participation:** if participants are taking a treatment already, they must be told to stop for the duration of the study. This must be voluntary.
- **Debriefing:** participants must be thoroughly debriefed at the conclusion of the study and told if they received a placebo or not.
- **Withdrawal rights:** participants must be told that they can withdraw at any time, especially with regard to taking a placebo.

Voluntary participation
a principle that ensures there is no coercion or pressure put on the participant to partake in an experiment, and they freely choose to be involved

Withdrawal rights
the right of participants to be able to discontinue their involvement in an experiment at any time during, or after the conclusion of, an experiment without penalty

KEY SCIENCE SKILLS

In the study design, this theory relates to the following dot point:

- Comply with safety and ethical guidelines
 - analyse and evaluate psychological issues using relevant ethical concepts and guidelines, including the influence of social, economic, legal and political factors relevant to the selected issue

When analysing psychological issues, one should consider the relevance of any social, economic, legal, and political factors. These can have ethical implications.

Theory details

In addition to considering ethical concepts and guidelines, researchers and psychologists should also consider the relevance of any sociocultural, economic, legal, and political factors to their:

- research
- analysis and evaluation of psychological issues
- work in the field.

These factors are important to ethics as they play a part in what is considered right and wrong. For example, something that is illegal may be considered wrong under the view of the law, but for some sociocultural groups, be seen as acceptable or ideal. When you analyse issues in Psychology as part of your VCE studies, you should also consider these factors. It's important to know that these factors are broad in nature and may overlap. In some contexts, for example, an economic factor may also be a sociocultural one. These factors are outlined in figure 3.

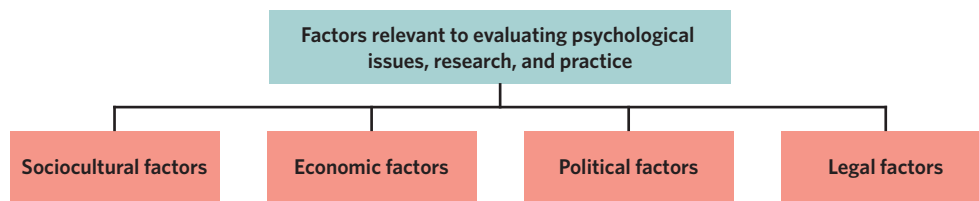


Figure 3 Factors to consider when evaluating psychological issues, research and practice

Factors

The factors relevant to psychological issues are explored in table 3. It's important to know that these four types of factors are umbrella terms. Within each type, there could be multiple factors. For example, a person's income, their job, and their family and friends' wealth could all be classed under the umbrella of 'economic factors'.

Table 3 Different factors relevant to psychological issues

| Factor | Explanation |
|------------------------------|---|
| Sociocultural factors | Sociocultural factors are the environmental conditions that impact the practices, beliefs, social norms, and expectations of individuals or groups. These factors include family support, education history and opportunity, and availability of healthcare. For example, when evaluating a psychological issue, considering the relevance of people's religious beliefs might be a sociocultural factor that requires consideration. |
| Economic factors | Economic factors are financial factors, such as the income of individuals, as well as financial characteristics of a study, such as the funding of the research. |
| Legal factors | Legal factors relate to how the law and legal systems influence individuals, groups, and organisations. When examining a psychological issue, one might consider whether any laws were broken. Further, when designing research, experimenters should ensure they are following relevant legislation. |
| Political factors | Political factors are the environmental conditions that impact the beliefs and actions of groups and individuals, including political climate, government policies and decisions, and international relations. |

Worked example

Psychological issue: The accessibility of mental health care services in Australia

We can see these four factors at play when we analyse and evaluate real-world issues or debates in psychology. There are many contemporary issues and debates in psychology, such as the use of animals in research, how to best address mental illness, the mind-body debate, the use of drugs for mental health and so on.

Accessing mental health care services (services and tools to treat mental health problems or mental illness) is a much-debated psychological issue in contemporary Australia for many reasons. Some argue that it is not accessible enough across wider society and needs to be improved. There are a range of factors that influence why people may or may not access mental health care services. We will now discuss these factors through the lens of the four umbrella factors in table 4. When you read these factors, consider how they may influence someone's perceptions about the ethics of the issue; i.e. what is right or wrong.

LESSON LINK

Although we are applying these factors to a psychological issue here, you will learn more about these four factors in relation to conducting research, in the **Student-designed scientific investigation guide**.

Table 4 Applying the four factors to the psychological issue of accessing mental health care services in Australia

| Factor | Examples relevant to the issue of accessing mental health care in Australia |
|------------------------------|--|
| Sociocultural factors | <ul style="list-style-type: none"> Stigma refers to a sense of shame surrounding something. There is often a sense of shame or embarrassment around having mental health issues and seeking help. This may serve as a barrier, stopping some people from accessing psychotherapy. Some cultures or social groups may, for a variety of reasons, be opposed to seeking mental health support. This may stem from a lack of belief in the importance of mental health, or again, stigmatisation. For example, men may be more hesitant to seek support as there is a societal and cultural expectation on men to be less emotional. Although this narrative may be shifting in Australia, it may still affect some. Education is another social factor that may affect access to psychotherapy. People may not be informed about the availability of services, or more generally, the importance of mental health. Culturally appropriate mental health care may also be limited for certain cultural groups. Much of modern psychotherapy was developed using western subjects, meaning its methods may not be appropriate or sensitive to other populations. This may prevent these populations from seeking mainstream mental health care services. Therefore, we can view this factor in regard to the ethical concept of respect. Ensuring that all people, regardless of their culture are treated with respect, can help address this issue and increase access to mental health services. |
| Economic factors | <ul style="list-style-type: none"> The affordability of mental health services is a major barrier for some in accessing them. Some mental health services, such as seeing a therapist, can be very expensive. The cost of medication may also be a major barrier for some. It is important to consider whether people have fair access to mental health services and medications, which is reflective of the ethical concept of justice as all people should have a fair distribution and access to mental health services. |
| Legal factors | <ul style="list-style-type: none"> Not all forms of mental health care are legal. In Australia, while talk therapy with a registered psychologist is legal, some other forms of therapy are not. For example, in some parts of the world, it is legal to undergo sessions with a therapist while under the influence of drugs like MDMA or psilocybin. This is not the case in Australia. When decisions are made regarding whether certain forms of mental health care are legal, it is important to consider it through the ethical lens of beneficence. Policy-makers need to consider if the potential benefits of a psychological treatment outweigh any risks. |
| Political factors | <ul style="list-style-type: none"> Government policies and legislation surrounding mental health care directly impact people's ability to access these services. Again, policy makers often consider ethical considerations, like beneficence, when making decisions. In Australia, Medicare subsidises (partially covers the cost of) a number of sessions with a psychologist. This means the out-of-pocket fee a person has to pay a psychologist is reduced. However, some argue that this subsidy is not enough as the remaining fees can still be costly and people may need more than 20 sessions. The legislation dictates that to access these sessions, people must also have a mental health care plan. This involves going to a doctor and filling out paperwork to get approved. This also relates to the ethical concept of justice in that it attempts to create a fairer distribution and access to mental health services. |

Theory summary

In this lesson, you learnt all about ethics in Psychology. You learnt the difference between the ethical concepts and ethical guidelines, as well as some factors that are important when analysing contemporary issues and debates in the field of psychology.

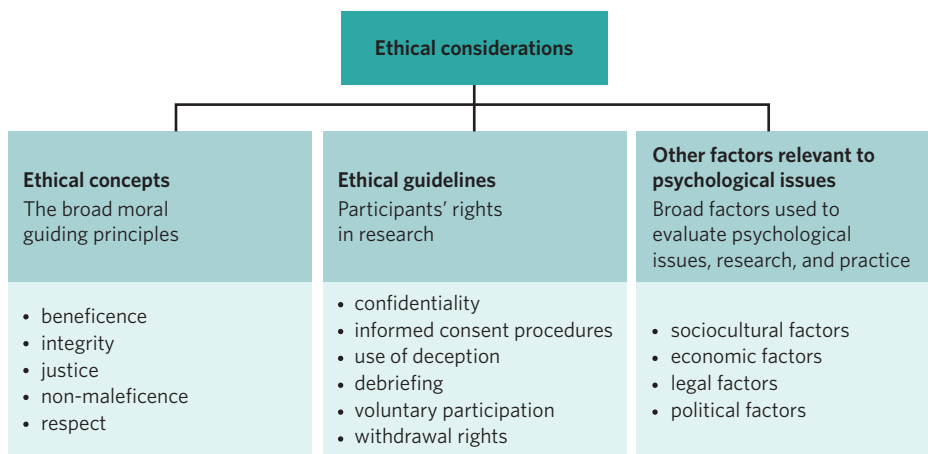


Figure 4 Components of ethical considerations in VCE Psychology

1G Questions

Theory review

Question 1

_____ refer to the broad moral guiding principles that psychologists and researchers should consider, whereas _____ are the rights research participants have and a researcher must ensure are met.

Which of the following best fills in the blanks?

- Ethical concepts, ethical guidelines.
- Ethical guidelines, ethical concepts.

Question 2

Which of the following are examples of ethical concepts? **(Select all that apply)**

- Justice.
- Respect.
- Confidentiality.
- Legal factors.
- Beneficence.

Question 3

Which of the following are examples of ethical guidelines? **(Select all that apply)**

- Integrity.
- Withdrawal rights.
- Debriefing.
- Justice.
- Voluntary participation.

Question 4

Sociocultural, economic, legal, and political factors all have an influence on the ethics of a situation.

- A. True.
- B. False.

Assessment skills**Perfect your phrasing****Question 5**

Which of the following sentences is most correct?

- A. Withdrawal rights refer to the **right** of participants to be able to discontinue their involvement in an experiment at any time **during or after the conclusion of an experiment**, without penalty.
- B. Withdrawal rights refer to the **ability** of participants to be able to discontinue their involvement in an experiment at any **time of a study**, without penalty.

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 6–8.

Media text 1**Is online therapy as good as talking face-to-face with a clinician?**

Author: Jo Abbott, Research Fellow / Health Psychologist, Swinburne University of Technology

Smartphones, tablets and computers are increasingly expanding the availability of health services. This means we can access help anonymously at a time and place that suits us.

Currently, only about one-third of people with mental health difficulties obtain help. While there are various reasons for this, practical factors such as availability of health professionals and travel, time and financial restrictions may limit access to mental health care.

People may also be reluctant to seek help, either because of concerns about the stigma attached to mental illness or because of a preference to self-manage symptoms.

While technology is not always a replacement for face-to-face treatment for mental health difficulties, it can offer increased choice and flexibility. It may also motivate some people to take that first step in seeking help.

Read the full article on The Conversation: <https://theconversation.com/is-online-therapy-as-good-as-talking-face-to-face-with-a-clinician-51492>

(Abbott, 2016)

Media text 2**Online therapy having its moment, bringing insights on how to expand mental health services going forward**

Author: Nicholas Joyce, Psychologist, University of South Florida

The coronavirus has resulted in stress, anxiety and fear – symptoms that might motivate a person to see a therapist. Because of social distancing, however, in-person sessions are less possible. For many, this has raised the prospect of online therapy. For clients in need of warmth and reassurance, could this work? Studies and my experience suggests it does.

I am a psychologist and counselor at the University of South Florida. When our center named me its online assisted therapies coordinator, many of the staff initially pushed back at the notion of providing services through the screen. These negative attitudes toward telehealth should have surprised me. After all, its antecedent, telephone crisis lines, have been accepted and effective for decades.

But my field of therapy has often been disdainful of telehealth, opposed to 'warm' psychotherapy work performed via a 'cold' screen. Its resistance to the concept has changed little over the years.

Continues ►

Media text 2 - Continued

Research suggests, however, that online therapy works just as well as traditional face-to-face therapy. Studies, looking at outcomes for clients and the quality of their relationships with therapists, found them equal across telehealth and in-person conditions. Since this meta-analysis (92 studies and 9,000 clients), many other studies have confirmed the value of teletherapy.

Read the full article on The Conversation:

<https://theconversation.com/online-therapy-having-its-moment-bringing-insights-on-how-to-expand-mental-health-services-going-forward-136374>

(Joyce, 2020)

Question 6

Which of the following is an economic factor that could be a barrier to accessing therapy mentioned in Article 1?

- A. The availability of therapists.
- B. Financial restrictions.
- C. Travel time.

Question 7

Which of the following is a social factor that could be a barrier to accessing therapy mentioned in Article 1?

- A. Financial restrictions.
- B. Travel time.
- C. Concerns about the stigma around mental illness.

Question 8

Which of the following is a social factor that may motivate people to only seek online therapy mentioned in Article 2?

- A. The coronavirus.
- B. The availability of therapists.

Exam-style**Remember and understand****Question 9** (1 MARK)

Which of the following is an ethical guideline that must be followed before the beginning of a study?

- A. Debriefing.
- B. Informed consent.
- C. Withdrawal rights.
- D. Confidentiality.

Question 10 (1 MARK)

Debriefing must be conducted

- A. at the end of every study.
- B. only when deception is used.
- C. only when participants request it.
- D. when an error has occurred.

Question 11 (1 MARK)

Anonymising participants' data is an example of

- A. debriefing.
- B. withdrawal rights.
- C. confidentiality.
- D. deception.

Question 12 (2 MARKS)

Identify and outline one ethical concept.

Apply and analyse

Question 13 (1 MARK)

Gillian is conducting research on the effects of study on the sleep patterns of adolescents. She recruits 20 16-year-old students from a local secondary school.

Before commencing this experiment, Gillian is ethically required to collect informed consent from

- A. the adolescents.
- B. a parent/legal guardian.
- C. the adolescents and their teachers.
- D. the adolescents and their parent/legal guardian.

Adapted from VCAA Psychology exam 2019 Q37

Question 14 (4 MARKS)

Doctor Petsopoulos is conducting a trial to test the efficacy of psilocybin on patients' mood and creativity. He uses a between-subjects group and gives the control group a placebo to serve as a baseline.

Explain how Doctor Petsopoulos would satisfy ethical guidelines in terms of using a placebo in his study.

Adapted from VCAA Psychology exam 2019 Q6c

Questions from multiple lessons

Use the following information to answer questions 15-17.

Professor Zeitgeist wants to test an intervention for improving low mood through cardiovascular exercise. He plans to recruit participants from the university's gym.

After reading the participant information sheet about the specific purposes of the study and signing a consent form, the groups will be randomised to either the experimental condition or the control condition.

The experimental group will be told to complete a gym circuit for 45 minutes of vigorous exercise, with no break or option to leave. The control group will not complete any exercise after providing consent.

Immediately after either condition, the participants will rate their feelings of mood across the study period, then Professor Zeitgeist plans to discuss the findings with the participants and any uncomfortable experiences they had. The groups will be assessed on their mood ratings. The key outcome will be the difference between the two conditions.

Adapted from VCAA Psychology exam 2021 Q37-39

Question 15 (1 MARK)

The ethics review panel requested modifications when it first received Professor Zeitgeist's study proposal.

Based on the information provided above, what did Professor Zeitgeist fail to consider?

- A. Deception.
- B. Debriefing.
- C. Informed consent.
- D. Withdrawal rights.

Question 16 (1 MARK)

Which experimental research design and sampling procedure is Professor Zeitgeist adopting?

- A. Within subjects with random sampling.
 - B. Between subjects with stratified sampling.
 - C. Between subjects with convenience sampling.
 - D. Within subjects with random stratified sampling.
-

Question 17 (1 MARK)

Professor Zeitgeist is concerned with how generalisable his findings are to people who cannot afford gym memberships and can only exercise outdoors or in makeshift settings.

Professor Zeitgeist's concern is primarily considering the influence of

- A. political factors on the external validity of his results.
- B. political factors on the internal validity of his results.
- C. economic factors on the external validity of his results.
- D. economic factors on the internal validity of his results.

Chapter 1 review

Chapter summary

In this chapter, you learnt about what constitutes scientific research, its process, and how it is evaluated.

In lesson **1A Introduction to research**, you learnt about how to identify scientific research and the fundamentals of psychological research. Specifically, you learnt about:

- the difference between scientific and non-scientific ideas.
- models and theories
- the scientific method, including
 - aims and hypotheses
 - variables.

In lesson **1B Scientific research methodologies**, you learnt about the different types of scientific investigation methodologies that researchers may use, including when they are appropriate and how they are evaluated. Specifically, you learnt about:

- types of psychological studies, including
 - controlled experiments (within subjects, between subjects, and mixed designs)
 - case studies
 - correlational studies.
- other processes and techniques, including
 - classification and identification
 - fieldwork (such as direct observation, qualitative interviews, questionnaires, focus groups, and yarning circles)
 - literature review
 - modelling
 - product, process, or system development
 - simulation.
- evaluation of investigation methodologies.

In lesson **1C Population, sample, and sampling**, you learnt about the ways in which researchers choose the participants for their study. Specifically, you learnt about:

- the difference between a population and a sample.
- sampling techniques, including
 - convenience sampling
 - random sampling
 - stratified sampling.
- allocation.

In lesson **1D Preventing error and bias**, you learnt about the potential problems that researchers face when conducting experiments, as well as ways to prevent or minimise them. Specifically, you learnt about:

- extraneous and confounding variables, including
 - participant-related variables
 - order effects
 - placebo effects
 - experimenter effects
 - situational variables
 - non-standardised instructions and procedures
 - demand characteristics.
- the prevention of extraneous and confounding variables, including
 - counterbalancing
 - placebo
 - single-blind procedure
 - double-blind procedure.

In lesson **1E Organising and interpreting data**, you learnt about the different types of data and how this data is organised, interpreted, and communicated. Specifically, you learnt about:

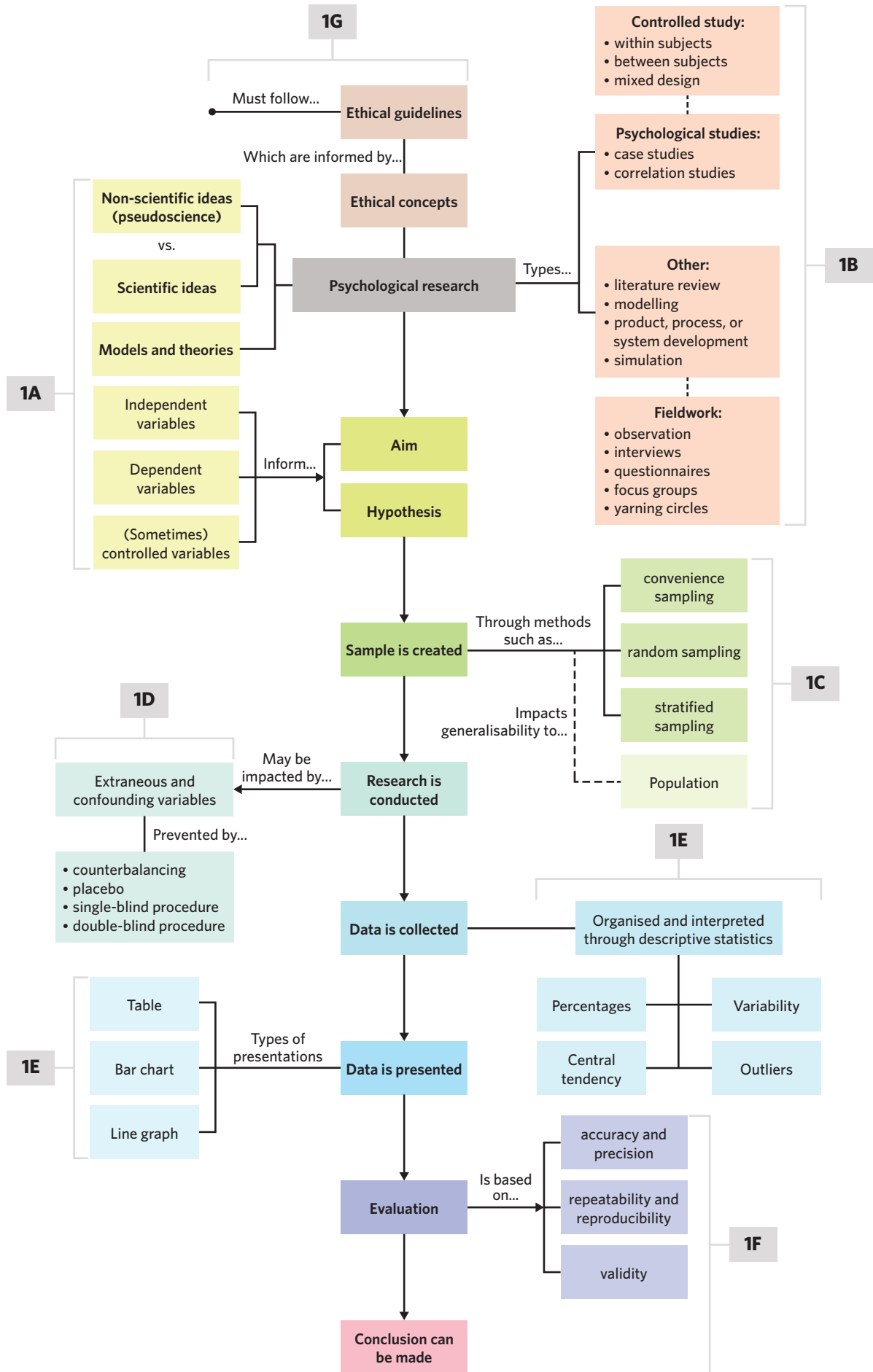
- the ways to categorise data, including
 - primary versus secondary data
 - quantitative versus qualitative data
 - objective versus subjective data.
- the processing of quantitative data through descriptive statistics, including
 - percentages
 - measures of central tendency (mean, median, and mode)
 - outliers
 - measures of variability.
- the presentation of data, including
 - tables
 - bar charts
 - line graphs.

In lesson **1F Evaluating research**, you learnt about the key concepts that must be considered when evaluating scientific research. Specifically, you learnt about:

- accuracy and precision, including
 - systematic errors
 - random errors
 - uncertainty in data.
- repeatability and reproducibility
- validity, including
 - internal validity
 - external validity.
- drawing conclusions.

In lesson **1G Ethical considerations**, you learnt about the strict ethical guidelines and rules that psychological research must adhere to. Specifically, you learnt about:

- ethical concepts, including
 - beneficence
 - integrity
 - justice
 - non-maleficence
 - respect.
- ethical guidelines, including
 - confidentiality
 - informed consent procedures
 - deception
 - debriefing
 - voluntary participation
 - withdrawal rights.
- factors to consider when evaluating psychological issues, including
 - sociocultural factors
 - economic factors
 - legal factors
 - political factors.



Chapter review activities

Review activity 1: Summary table

This chapter provided a comprehensive overview of the process of, and the considerations involved in, conducting scientific research. The table below separates some key concepts that you have learnt into the different stages of conducting research. For each concept, outline key information. This may include defining the concept, outlining other related terms, or a detailed description. You may also provide one or more examples of each concept.

| | Concept | Key information | Example |
|--|---|-----------------|---------|
| 1. Prior to conducting research | Consideration of scientific versus non-scientific ideas | | |
| | Developing an aim | | |
| | State a hypothesis | | |
| | Choice of investigation methodology | | |
| 2. During research | Sample is obtained | | |
| | Measurement of variables | | |
| | Consideration of ways to prevent error and bias | | |
| 3. After research | Organisation of data | | |
| | Presentation of data | | |
| | Evaluation of study | | |
| | Conclusion | | |

Review activity 2: Label the scenario

For each research scenario listed below, identify the investigation methodology that has been used. Choose from the following:

- case study
- correlational study
- controlled experiment
- focus group.

Scenario 1: A researcher is interested in how a specific terrorist attack has affected those involved. He decides to select a sample of three individuals who witnessed the event and studies them in-depth, collecting qualitative data through interviews.

Scenario 2: A company wants to develop an energy drink that appeals to teenage girls. In order to find the most effective packaging, they decide to sample a small group of 14-18-year-old girls and ask them questions as a group about their preferences and previous buying habits.

Scenario 3: A scientist is interested in the effects that caffeine has on concentration. She selects a random sample of participants and allocates them to two groups. Both groups are made to complete a cognitive task, with one group being given caffeine prior, and one being given a placebo.

Scenario 4: A researcher is interested in whether the severity of depression is sex-specific. She selects a random sample of participants who had previously been diagnosed with depression. She gives the participants a questionnaire to quantify the severity of their symptoms on a scale and then compares the results of the females and the males.

Chapter 1 test

Multiple choice

Question 1 (1 MARK)

Which of the following would qualify as a within subjects design?

- A. Measuring the amount of sleep that pregnant mothers get before having a baby and then measuring again after they give birth.
- B. Testing participants' IQ and levels of creativity in order to determine if there is a relationship between the two.
- C. Measuring the height of participants at the beginning of a study, and then again after 10 years in order to determine the average growth of adults per year.
- D. Analysing the beliefs of individuals from Western and Eastern cultures by conducting a qualitative interview with one sample from each culture.

Question 2 (1 MARK)

Allocation involves

- A. allocating a group of individuals to represent the population.
- B. selecting people from the population in a way that ensures that its strata (subgroups) are proportionally represented in the sample.
- C. assigning participants to experimental conditions.
- D. allocating the investigation methodology that will be used for the study.

Question 3 (1 MARK)

Which of the following is **not** true about ethics in research?

- A. The no-harm principle suggests that any unnecessary harm to participants should be avoided.
- B. Ethical guidelines are broad moral principles that inform ethical concepts in research.
- C. Participants are able to withdraw from the research at any point in the study, this includes their data also being removed.
- D. The use of deception in research is permissible when participants' knowledge of the true purpose of the experiment may affect their behaviour while participating in the study.

Question 4 (1 MARK)

Which of the following statements regarding external validity is the most accurate?

- A. External validity is only considered when internal validity is achieved.
- B. External validity is the extent to which an investigation truly measures what it claims to.
- C. External validity is the extent to which the results of an investigation can be applied to different individuals in similar settings.
- D. External validity can be improved by using a stricter inclusion criteria.

Question 5 (1 MARK)

If a researcher wanted to report on the extent to which the participant's results differed from one another, what statistic would be most appropriate?

- A. The mean.
- B. A bar chart.
- C. The outliers.
- D. The standard deviation.

Short answer**Question 6** (10 MARKS)

Niam is in university and has been asked to evaluate whether a specific paper involves a scientific idea or a non-scientific idea.

- Using an example, explain what is meant by a non-scientific idea. (2 MARKS)
- Outline three qualities that would indicate that the paper involves a scientific idea. (3 MARKS)
- Identify and explain the method that is most commonly used in the investigation of scientific ideas. (2 MARKS)
- Niam is then asked to write a potential conclusion for the idea outlined in the paper. Identify the three considerations Niam should address when writing her conclusion. (3 MARKS)

Question 7 (5 MARKS)

Pearl is interested in investigating the effectiveness of using approach strategies (strategies that directly confront the source of stress) to cope with stress for high school students. She selects a sample of 20 high-school students and assigns half of the sample to the control and half of the sample to the experimental group.

- Outline the conditions of the control and the experimental group for this study and explain why control groups are beneficial to scientific research. (3 MARKS)
- Pearl's study provided promising results about the effectiveness of this strategy. However, she is worried that her findings were just a fluke. Describe two measures that Pearl could use in order to ensure her findings are not a 'one-off'. (2 MARKS)

Question 8 (10 MARKS)

Meadow has set out to conduct her first-ever scientific investigation. She wants to study the effects of sleep deprivation on emotional regulation. So far, Meadow has recruited 10 participants who responded to her advertisement in the newspaper. However, she now has no plan for how she will proceed with her study.

You are recruited to complete Meadow's study for her and write a report about your findings.

Your report should include:

- any relevant introductory statements.
- the methods and procedures of the investigation.
- the type of data that was collected and how this would be reported.
- an evaluation of the study, including any limitations and any improvements that could be implemented in future research.



UNIT 3

How does experience affect behaviour and mental processes?

In this unit students investigate the contribution that classical and contemporary research has made to the understanding of the functioning of the nervous system and to the understanding of biological, psychological and social factors that influence learning and memory.

Students investigate how the human nervous system enables a person to interact with the world around them. They explore how stress may affect a person's psychological functioning and consider stress as a psychobiological process, including emerging research into the relationship between the gut and the brain in psychological functioning.

Students investigate how mechanisms of learning and memory lead to the acquisition of knowledge and the development of new and changed behaviours. They consider models to explain learning and memory as well as the interconnectedness of brain regions involved in memory. The use of mnemonics to improve memory is explored, including Aboriginal and Torres Strait Islander peoples' use of place as a repository of memory.

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UNIT 3 AOS 1

How does the nervous system enable psychological functioning?

In this area of study students explore the role of different branches of the nervous system in enabling a person to integrate, coordinate and respond to internal and external sensory stimuli. Students apply their understanding of neurotransmitters in the transmission of neural information across a neural synapse to produce excitatory and inhibitory effects and explore the effect that neuromodulators have on brain activity. The interaction of gut microbiota with stress and the nervous system in the control of processes and behaviour is also explored.

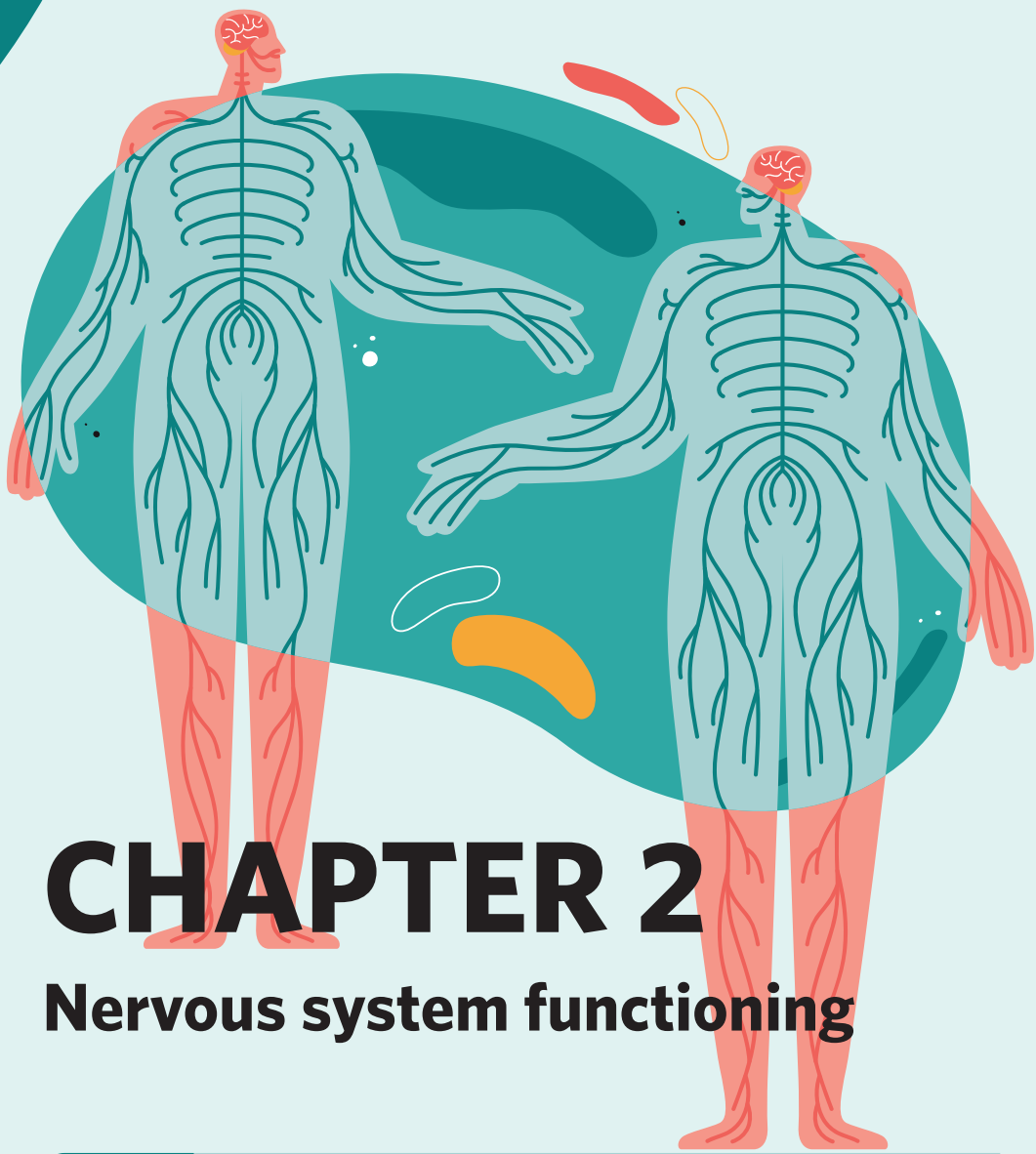
Students evaluate the ways in which stress can affect mental wellbeing, by considering stress as a psychobiological process. They compare the explanatory power of different models that explain stress as well as exploring strategies for coping with stress and improving mental wellbeing.

Outcome 1

On completion of this unit the student should be able to analyse how the functioning of the human nervous system enables a person to interact with the external world, and evaluate the different ways in which stress can affect psychobiological functioning.

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2



CHAPTER 2

Nervous system functioning

LESSONS

- 2A** The nervous system
- 2B** Conscious and unconscious responses
- 2C** Neurotransmitters and neuromodulators
- 2D** Synaptic plasticity

KEY KNOWLEDGE

- the roles of different subdivisions of the central and peripheral nervous systems in responding to, and processing and coordinating with, sensory stimuli received by the body to enable conscious and unconscious responses, including spinal reflexes
- the role of neurotransmitters in the transmission of neural information across a neural synapse to produce excitatory effects (as with glutamate) or inhibitory effects (as with gamma-amino butyric acid [GABA]) as compared to neuromodulators (such as dopamine and serotonin) that have a range of effects on brain activity
- synaptic plasticity - resulting from long-term potentiation and long-term depression, which together act to modify connections between neurons (sprouting, rerouting and pruning) - as the fundamental mechanism of memory formation that leads to learning

2A The nervous system

STUDY DESIGN DOT POINT

- the roles of different subdivisions of the central and peripheral nervous systems in responding to, and processing and coordinating with, sensory stimuli received by the body to enable conscious and unconscious responses, including spinal reflexes

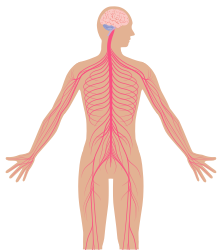
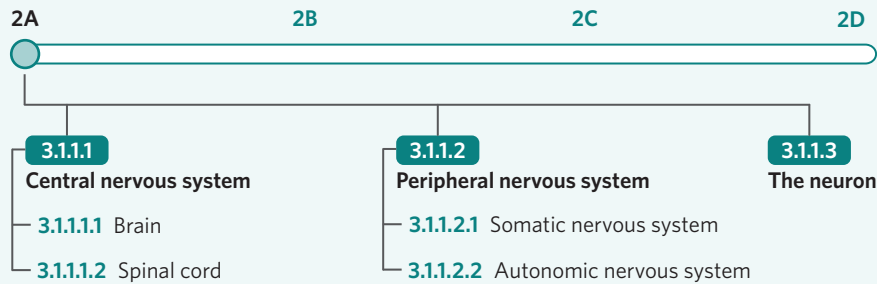


Image: metamorworks/Shutterstock.com

There are eleven organ systems in the human body, one of which is the nervous system. The human nervous system enables the brain and the body to exchange neural messages and communicate with one another. The nervous system has various divisions and subdivisions, each with its own structure and function.

In this lesson, you will learn about the nervous system. Specifically, you will learn about the divisions and subdivisions of the nervous system.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Central nervous system
a major division of the nervous system comprising the brain and spinal cord, which receives neural messages from and transmits neural messages to the peripheral nervous system

Central nervous system 3.1.1.1

The central nervous system comprises the brain and spinal cord and is therefore 'central' to the body. It is from this centre that all bodily activity is coordinated and integrated.

Theory details

The nervous system has two major divisions: the central nervous system and the peripheral nervous system. You will learn about the central nervous system in this section of the lesson and the peripheral nervous system in the next section of the lesson.

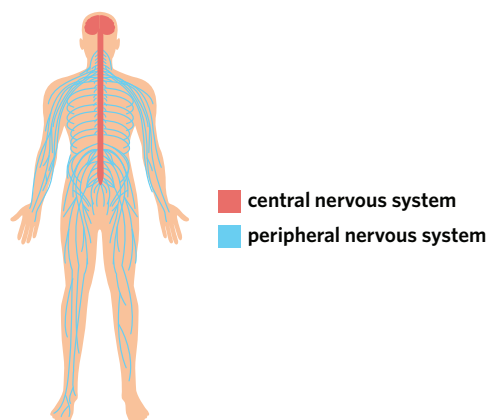


Figure 1 The central nervous system and the peripheral nervous system are the two major divisions of the nervous system

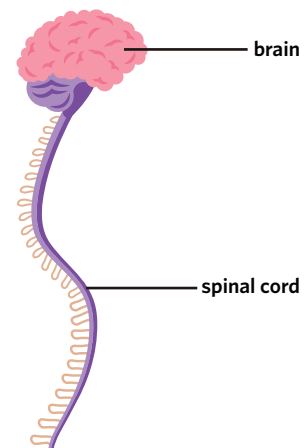


Figure 2 The central nervous system comprises the brain and the spinal cord

The **central nervous system** is a major division of the nervous system comprising the brain and spinal cord, which receives neural messages from and transmits neural messages to the peripheral nervous system. The central nervous system processes information from the internal and external environment and formulates responses to this information. You will learn more about this in the next lesson of this chapter.

Brain 3.1.1.1

The **brain** is a complex organ contained within the skull that coordinates mental processes and behaviour and regulates bodily activity. This component of the central nervous system is often considered to be the ‘control centre’ of the body because it controls physiological and psychological processes. For example, your brain is involved in every sensation you experience and every movement you make. In this way, your brain enables you to perceive, interact with, and respond to the world around you.

Spinal cord 3.1.1.2

The **spinal cord** is a cable of nerve tissue that extends from the brain, connecting it to the peripheral nervous system. This component of the central nervous system is composed of afferent tracts, which transmit sensory messages from the peripheral nervous system to the brain, and efferent tracts, which transmit motor messages from the brain to the peripheral nervous system. In this way, the spinal cord is the route via which neural information travels between the brain and the body.

Brain a complex organ contained within the skull that coordinates mental processes and behaviour, and regulates bodily activity

Spinal cord a cable of nerve tissue that extends from the brain, connecting it to the peripheral nervous system

Peripheral nervous system 3.1.1.2

The peripheral nervous system comprises all the neurons outside of the brain and spinal cord. These neurons are in the periphery of your body, connecting the central nervous system with your external world.

Theory details

The **peripheral nervous system** is a major division of the nervous system comprising every neuron in the body outside the central nervous system. It transmits neural messages between the central nervous system and the body. The peripheral nervous system is further divided into the somatic nervous system and the autonomic nervous system.

Somatic nervous system 3.1.1.2.1

The **somatic nervous system** is a division of the peripheral nervous system that transmits neural messages related to voluntary motor movement.

The somatic nervous system comprises:

- sensory neural pathways, which are made up of sensory neurons.
- motor neural pathways, which are made up of motor neurons.

Sensory neural messages travel from sensory receptors, which are nerve endings that detect sensations, to the central nervous system via afferent neural pathways in the somatic nervous system. Motor neural messages travel from the central nervous system to **skeletal muscles**, which are muscles connected to the skeleton that carry out voluntary motor movements, via efferent neural pathways in the somatic nervous system. In this way, the somatic nervous system has an important role in responding to sensory stimuli and initiating voluntary motor movements. You will learn more about this in the next lesson of this chapter.

Peripheral nervous system

a major division of the nervous system comprising every neuron in the body outside the central nervous system

Somatic nervous system

a division of the peripheral nervous system that transmits neural messages related to voluntary motor movement

Skeletal muscles muscles connected to the skeleton that carry out voluntary motor movements

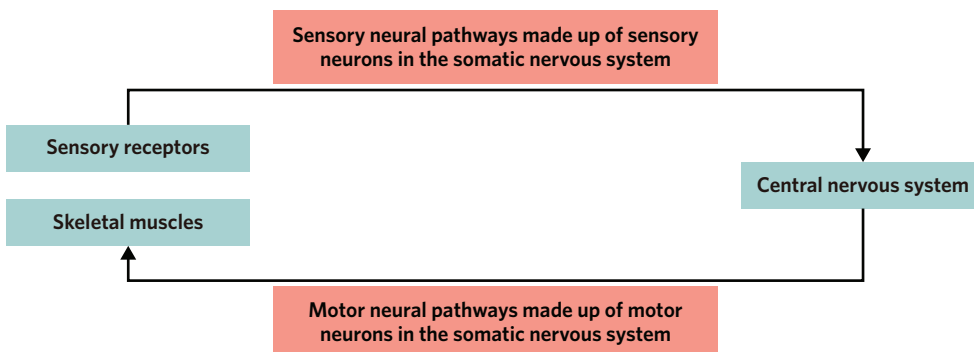


Figure 3 The somatic nervous system transmits neural messages between sensory receptors, the central nervous system, and skeletal muscles

USEFUL TIP

The 'autonomic nervous system' is commonly mislabelled by students as the 'automatic nervous system'. The word 'autonomic' is very similar to the word 'automatic', so it is important not to confuse these words.

Autonomic nervous system a division of the peripheral nervous system that regulates visceral muscles, organs, and glands, and transmits neural messages to the central nervous system about their activity

Visceral muscles, organs, and glands muscles, organs, and glands not connected to the skeleton that are predominantly self-regulating and do not require conscious control

Sympathetic nervous system a division of the autonomic nervous system that activates visceral muscles, organs, and glands, preparing the body to respond to a threat or stressor

Parasympathetic nervous system a division of the autonomic nervous system that maintains the optimal and balanced functioning of visceral muscles, organs, and glands

Autonomic nervous system 3.1.1.2.2

The **autonomic nervous system** is a division of the peripheral nervous system that regulates visceral muscles, organs, and glands, and transmits neural messages to the central nervous system about their activity.

The autonomic nervous system controls **visceral muscles, organs, and glands**, which are muscles, organs, and glands not connected to the skeleton that are predominantly self-regulating and do not require conscious control. In this way, the autonomic nervous system is involved in unconscious responses, which you will learn more about in the next lesson of this chapter. Figure 4 displays the visceral muscles, organs, and glands that are controlled by the autonomic nervous system.

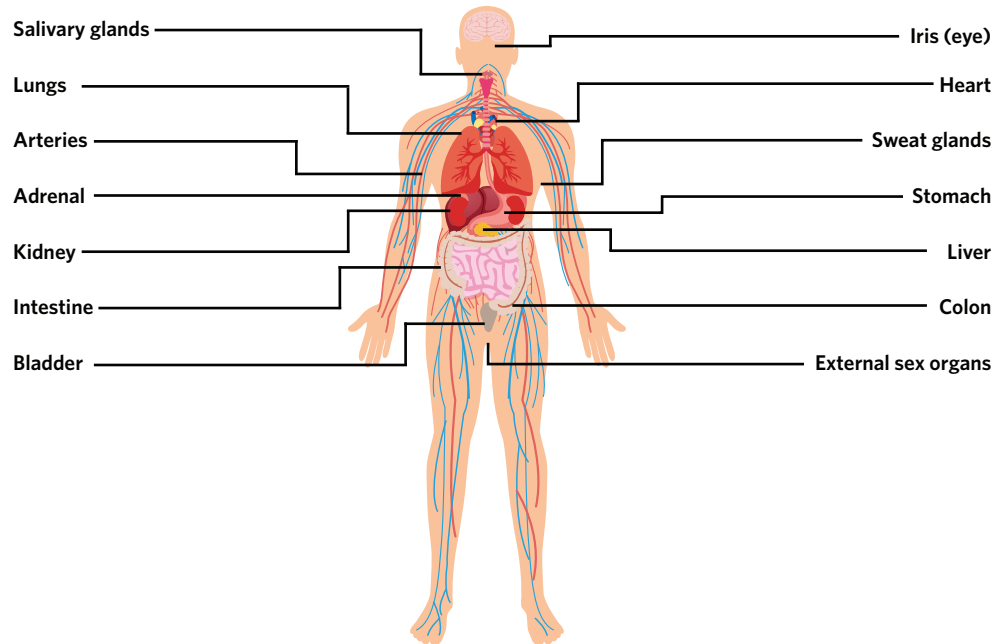


Figure 4 The visceral muscles, organs, and glands that are controlled by the autonomic nervous system

The autonomic nervous system is further divided into the sympathetic nervous system and the parasympathetic nervous system. These divisions of the autonomic nervous system are explained in table 1.

Table 1 The divisions of the autonomic nervous system

| Division | Explanation |
|---------------------------------------|--|
| Sympathetic nervous system | The sympathetic nervous system is a division of the autonomic nervous system that activates visceral muscles, organs, and glands, preparing the body to respond to a threat or stressor. Sympathetic responses energise the body, enabling it to engage in high levels of physical activity and confront a threatening or stressful situation. |
| Parasympathetic nervous system | The parasympathetic nervous system is a division of the autonomic nervous system that maintains the optimal and balanced functioning of visceral muscles, organs, and glands. This involves returning them to optimal and balanced functioning after experiencing heightened bodily arousal due to sympathetic responses, as well as maintaining homeostasis. If visceral muscles, organs, and glands remained at this increased level of functioning, even once the threat or stressor is no longer present, bodily resources would become depleted. |

USEFUL TIP

These memory devices may help you remember the difference between the two divisions of the autonomic system:

- The **sympathetic** nervous system is activated in stressful situations that would evoke sympathy from other people.
- The **parasympathetic** nervous system can be compared to a parachute, returning the body to optimal and balanced functioning after it has been energised.

Given their different roles, the sympathetic nervous system and the parasympathetic nervous system provoke different physiological responses in visceral muscles, organs, and glands. You will learn more about this in the next lesson of this chapter.

USEFUL TIP

Some divisions and subdivisions of the nervous system start with the same letter, including:

- peripheral nervous system and parasympathetic nervous system
- somatic nervous system and sympathetic nervous system.

Therefore, when responding to questions about the nervous system, it is important to only abbreviate divisions and subdivisions after writing the full term and enclosing the abbreviation in brackets the first time you mention it. This ensures that the assessor knows exactly which division or subdivision of the nervous system you are referring to.

For example, the first time you refer to the peripheral nervous system in your response, you would write 'the peripheral nervous system (PNS) is...'. You could then write 'PNS' when you refer to the peripheral nervous system again in your response.

The neuron 3.1.1.3

The neuron is the basic structural and functional unit of the nervous system. It is therefore important to learn about the neuron to understand the nervous system.

Theory details

A **neuron** is a nerve cell that receives and transmits neural information. The nervous system is composed of billions of neurons arranged in neural pathways along which neural messages are transmitted. In this way, the neuron is the basic structural and functional unit of the nervous system.

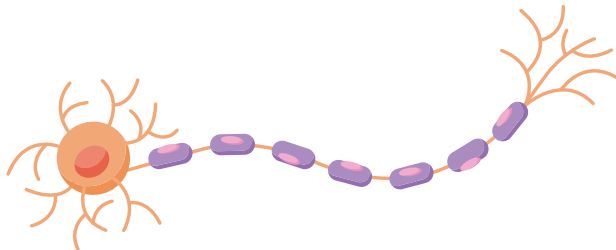


Figure 5 A basic diagram of a neuron

There are three types of neurons:

- **Motor neurons (also known as efferent neurons)**, which transmit neural messages about motor movement from the central nervous system to the peripheral nervous system.
- **Sensory neurons (also known as afferent neurons)**, which transmit neural messages about bodily sensations from the peripheral nervous system to the central nervous system.
- **Interneurons**, which transfer neural messages between sensory neurons and motor neurons. The central nervous system, including the brain and spinal cord, is made up of interneurons.

USEFUL TIP

The study design dot point does not explicitly mention neurons. However, it is important to have an understanding of neurons in order to understand the concepts within this chapter, particularly the nervous system.

Neuron a nerve cell that receives and transmits neural information

Motor neurons (also known as efferent neurons) neurons that transmit neural messages about motor movement from the central nervous system to the peripheral nervous system

Sensory neurons (also known as afferent neurons) neurons that transmit neural messages about bodily sensations from the peripheral nervous system to the central nervous system

Interneurons neurons that transfer neural messages between sensory neurons and motor neurons

USEFUL TIP

When referring to the nervous system, the words 'sensory' and 'afferent' can be used interchangeably. Similarly, the words 'motor' and 'efferent' can be used interchangeably. For example, 'sensory neural messages' may be referred to as 'afferent neural messages' and 'motor neural pathways' may be referred to as 'efferent neural pathways'.

The acronym 'SAME' is a memory device that may help you remember this:

Sensory is also known as

Afferent

Motor is also known as

Efferent

The reason why these words are interchangeable is because in the dictionary, 'afferent' means inwards and 'efferent' means outwards. In this way, sensory neural messages travel inwards to the central nervous system and motor neural messages travel outwards from the central nervous system.

You can remember this as **a**fferent neurons **a**rriving at the brain and **e**fferent neurons **e**xiting the brain.

Theory summary

In this lesson, you learnt about the nervous system. Specifically, you learnt about its divisions and subdivisions, which are summarised in figure 6. In the next lesson of this chapter, you will expand on this knowledge to learn how the divisions and subdivisions of the nervous system enable you to consciously and unconsciously respond to sensory stimuli.

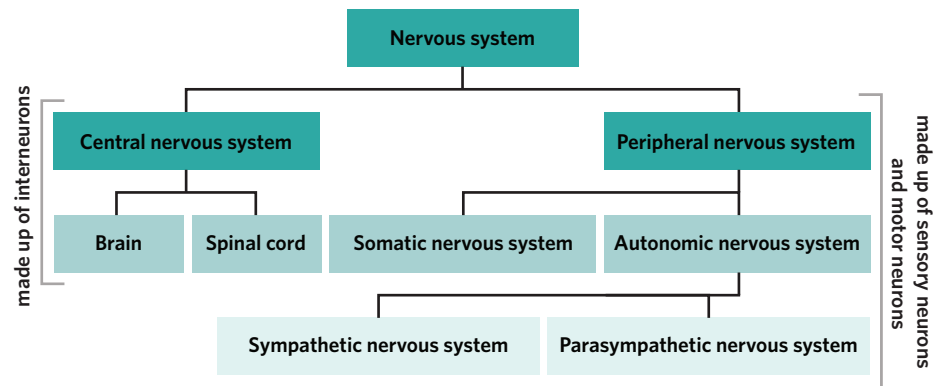


Figure 6 The divisions and subdivisions of the nervous system

2A Questions

Theory review**Question 1**

The neuron is the basic structural and functional unit of the nervous system.

- A. True.
- B. False.

Question 2

Which of the following are types of neurons? **(Select all that apply)**

- I. Interneurons.
- II. Motor neurons.
- III. Central neurons.
- IV. Sensory neurons.

Question 3

Which of the following is **not** a major division of the nervous system?

- A. Peripheral nervous system.
- B. Central nervous system.
- C. Parasympathetic nervous system.

Question 4

The brain and the spinal cord are made up of neurons, specifically motor neurons and sensory neurons.

- A. True.
- B. False.

Question 5

The somatic nervous system comprises afferent (_____) neural pathways and efferent (_____) neural pathways.

Which of the following best fills in the blanks?

- A. sensory; motor
- B. motor; sensory

Question 6

The automatic nervous system can be further divided into the sympathetic nervous system and the parasympathetic nervous system.

- A. True.
- B. False.

Question 7

Which of the following are examples of visceral muscles, organs, and glands? **(Select all that apply)**

- I. Leg muscles.
- II. Heart.
- III. Bladder.
- IV. Sweat glands.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

Which of the following is an accurate statement?

- A. Both the central nervous system and the peripheral nervous system are made up of interneurons.
- B. Both the central nervous system and the peripheral nervous system are made up of sensory neurons and motor neurons.
- C. The central nervous system is made up of interneurons, whereas the peripheral nervous system is made up of sensory neurons and motor neurons.
- D. The central nervous system is made up of motor neurons, whereas the peripheral nervous system is made up of sensory neurons.

Question 9

The _____ nervous system controls skeletal muscles, whereas the _____ nervous system controls visceral muscles, organs, and glands.

Which of the following best fills in the blanks?

- A. parasympathetic; sympathetic
- B. sympathetic; parasympathetic
- C. autonomic; somatic
- D. somatic; autonomic

Question 10

Which of the following is **not** an accurate statement?

- A. The sympathetic nervous system maintains a state of balance and rest in the body, whereas the parasympathetic nervous system energises the body to engage in high levels of physical activity.
- B. Both the sympathetic nervous system and the parasympathetic nervous system involve activity of the visceral muscles, organs, and glands.
- C. The sympathetic nervous system prepares the body to respond to a threat or stressor, whereas the parasympathetic nervous system returns the body to optimal and balanced functioning after confronting a threat or stressor.

Question 11

The somatic nervous system has afferent and efferent neural pathways, and the spinal cord has afferent and efferent tracts, which transmit neural messages. The afferent neural pathways and tracts are **both** made up of sensory neurons.

- A. True.
- B. False.

Question 12

Both the peripheral nervous system and the parasympathetic nervous system can be further divided into more subdivisions of the nervous system.

- A. True.
- B. False.

Exam-style**Remember and understand****Question 13** (1 MARK)

Which of the following statements about the central nervous system and the peripheral nervous system is incorrect?

- A. The peripheral nervous system comprises sensory neurons and motor neurons.
- B. Both the central nervous system and the peripheral nervous system are major divisions of the nervous system.
- C. The central nervous system comprises the brain and spinal cord, which are made up of interneurons.
- D. The central nervous system comprises the brain and spinal cord, whereas the peripheral nervous system comprises every neuron in the body.

Question 14 (2 MARKS)

Explain what is meant by skeletal muscles and identify the division of the nervous system that controls them.

Question 15 (2 MARKS)

Describe one similarity and one difference between the sympathetic nervous system and the parasympathetic nervous system.

Apply and analyse

Question 16 (1 MARK)

Jimmy and Charlie are friends who are watching the tennis grand final at the Australian Open together. Jimmy and Charlie support opposing players. Toward the end of the game, Jimmy is extremely excited because his player is slightly in front on the scoreboard, whereas Charlie is extremely nervous because his player is slightly behind on the scoreboard.

The divisions of the autonomic nervous system that are dominant towards the end of the game for Jimmy and Charlie are

- A. the sympathetic nervous system and the sympathetic nervous system, respectively.
- B. the sympathetic nervous system and the parasympathetic nervous system, respectively.
- C. the parasympathetic nervous system and the sympathetic nervous system, respectively.
- D. the parasympathetic nervous system and the parasympathetic nervous system, respectively.

Question 17 (4 MARKS)

Explain the role of the neuron in the nervous system.

Question 18 (4 MARKS)

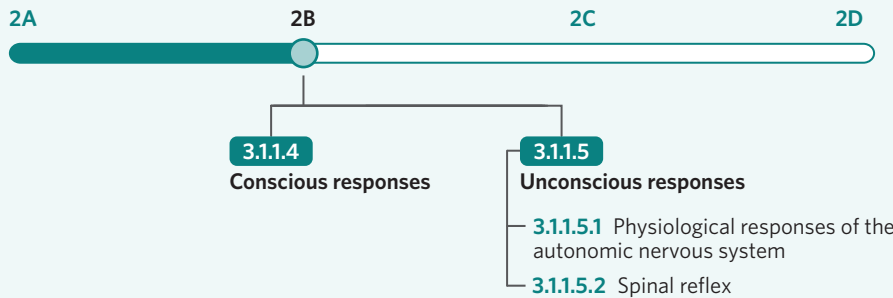
Ava is watching a scary movie. A large clown suddenly appears on screen and begins to laugh hysterically. Ava feels her heart begin to pound in her chest and her stomach feels nauseous as she watches this terrifying scene. She decides that she can no longer continue to watch this movie, picking up the remote and turning off the television.

Identify two divisions of Ava's nervous system that are activated as she watches the scary movie. Justify your response, with reference to the scenario.

2B Conscious and unconscious responses

STUDY DESIGN DOT POINT

- the roles of different subdivisions of the central and peripheral nervous systems in responding to, and processing and coordinating with, sensory stimuli received by the body to enable conscious and unconscious responses, including spinal reflexes



Your senses are constantly bombarded with incoming stimuli from your internal and external environment. You consciously and unconsciously respond to this sensory information, often without giving much thought to how you formulate these responses. Meanwhile, your nervous system is constantly working to process, coordinate, and respond to the sensory stimuli that surrounds you.

In the previous lesson, you learnt about the divisions and subdivisions of the nervous system. In this lesson, you will expand on this knowledge to learn about how these divisions and subdivisions of the nervous system enable you to consciously and unconsciously respond to sensory stimuli.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Conscious response
a deliberate and voluntary action that is initiated by the brain and performed intentionally by the body

Sensory receptor
a nerve ending that detects internal sensations in the body and external sensations from the environment


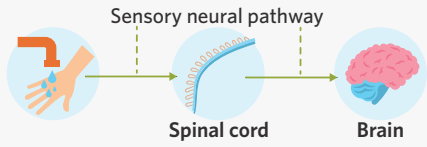

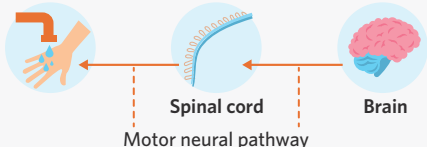

Conscious responses 3.1.1.4

In this section of the lesson, you will learn about how your nervous system enables you to consciously respond to sensory stimuli in your internal and external environment.

Theory details

Conscious responses are deliberate and voluntary actions that are intentionally initiated by the brain and performed by the body. Therefore, conscious responses involve the central nervous system because the brain is a component of the central nervous system. The performance of a conscious response by the body also involves the somatic nervous system, which is a division of the peripheral nervous system. Table 1 explains how the central nervous system and the somatic nervous system interact to enable conscious responses to internal and external sensory stimuli.

Table 1 Conscious responses to internal and external sensory stimuli

| Step | Explanation | Example | Diagram |
|------|---|--|--|
| 1 | The sensory stimulus comes into contact with sensory receptors , which are nerve endings that detect internal sensations in the body and external sensations from the environment. | Cold water comes into contact with sensory receptors on a person's hand, which detect the cold sensation. |  |
| 2 | This sensory neural message is transmitted via afferent pathways in the somatic nervous system, and then the spinal cord, to the brain. | The cold sensation is transmitted to the brain via sensory neural pathways represented by the green line. |  |
| 3 | The brain processes this sensory information, coordinating and initiating a conscious motor response. | The brain receives and processes the cold sensation, coordinating and initiating a motor response to turn on the 'hot' tap to increase the temperature of the water. |  |
| 4 | This motor neural message is transmitted via efferent pathways in the spinal cord, and then the somatic nervous system, to skeletal muscles. | This motor response is transmitted to skeletal muscles via motor neural pathways represented by the red line. |  |
| 5 | The skeletal muscles carry out the conscious motor response to the sensory stimulus. | Skeletal muscles move the person's hand towards the 'hot' tap to increase the temperature of the water. |  |

USEFUL TIP

The following analogy, which is presented in figure 1, may help you understand how the somatic nervous system and the central nervous system interact to enable conscious responses to internal and external sensory stimuli.

You can think of the central nervous system as a 'post office' to which sensory 'letters' (neural messages) are sent from various 'addresses' (sensory receptors). It is from this 'post office' that motor 'letters' (neural messages) are dispatched to various 'addresses' (skeletal muscles).

Furthermore, you can think of the tracts of the spinal cord and neural pathways of the somatic nervous system as the 'route' via which these letters travel between the post office and various addresses.

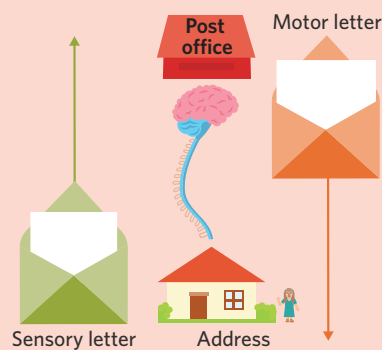


Figure 1 Sensory and motor letters (neural messages) travel between the post office (central nervous system) and various addresses (sensory receptors and skeletal muscles)

WANT TO KNOW MORE?

As you have learnt, neural messages travel along the spinal cord between the brain and the peripheral nervous system. If a person sustains damage to their spinal cord, these neural messages may not be effectively and efficiently transmitted. This may cause significant sensory impairments, such as numbness and tingling, and significant motor impairments, such as weakness and loss of movement. In extreme cases, the person may experience a complete loss of sensation and mobility below the site of the spinal cord injury.

Unconscious responses 3.1.1.5

In this section of the lesson, you will learn about how your nervous system enables you to unconsciously respond to sensory stimuli in your internal and external environment.

Theory details

Unconscious response
an automatic and involuntary action that is performed by the body independently of the brain

Unconscious responses are automatic and involuntary actions that are performed by the body independently of the brain. They occur without conscious awareness in response to internal and external sensory stimuli. The unconscious responses that you will learn about are:

- physiological responses of the autonomic nervous system
- the spinal reflex.

USEFUL TIP

It is important to know how to distinguish conscious responses and unconscious responses. The distinguishing characteristic is brain involvement: conscious responses are initiated by the brain, whereas unconscious responses are not initiated by the brain.

This does not necessarily mean that the brain is unaware of an unconscious response. For example, your brain may register an unconscious response occurring, such as your heart rate increasing, even though it is not consciously controlling this physiological response.

Physiological responses of the autonomic nervous system 3.1.1.5.1

In the previous lesson, you learnt that the autonomic nervous system, which is a division of the peripheral nervous system, controls visceral muscles, organs, and glands that are predominantly self-regulating and do not require conscious control. In this way, the autonomic nervous system is involved in the unconscious physiological responses of these visceral muscles, organs, and glands.

You also learnt about the roles of the sympathetic nervous system and the parasympathetic nervous system, which are divisions of the autonomic nervous system. The sympathetic nervous system becomes dominant when a person is confronted with a threat or stressor, whereas the parasympathetic nervous system is dominant during rest and physical inactivity. There are different unconscious physiological responses of the visceral muscles, organs, and glands that occur depending on which of these divisions is dominant. When the sympathetic nervous system is dominant, physiological responses occur to energise the body, preparing it to confront or escape the threat or stressor. When the parasympathetic nervous system is dominant, physiological responses occur that maintain optimal and balanced functioning. These unconscious physiological responses are outlined in table 2.

Table 2 Unconscious physiological responses of the autonomic nervous system

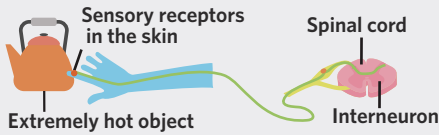
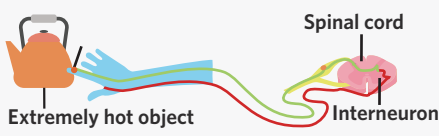
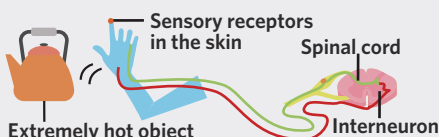
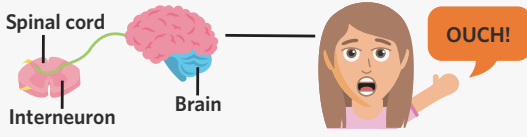
| Sympathetic responses | Parasympathetic responses |
|--|--|
| <ul style="list-style-type: none"> • Heart rate increases to increase blood flow, enabling high levels of physical activity. • Breathing rate increases and lung airways expand to increase oxygenation, enabling high levels of physical activity. • Pupils dilate to allow more light to enter the eyes, improving vision. • Adrenal glands secrete stress hormones, such as adrenaline, to energise the body. • Sweat glands are activated, increasing perspiration. • Digestion is inhibited to conserve energy required for high levels of physical activity. • The bladder relaxes to conserve energy, enabling this energy to be directed to other bodily processes that need it more during high levels of physical activity. • The body releases more glucose to energise the body. | <ul style="list-style-type: none"> • The heart beats at a steady and regular rate that supports optimal and balanced functioning. • Lung airways constrict, enabling a steady and regular breathing rate. • Pupils constrict according to external light levels, allowing an appropriate amount of light to enter the eyes for adequate vision. • Adrenal glands do not secrete stress hormones, such as adrenaline, to allow the body to rest. • Sweat glands are regulated, controlling perspiration. • Digestion occurs normally, enabling food to be metabolised by the body. • The bladder constricts and urination is controlled. • The body releases less glucose to allow the body to rest and prevent the depletion of energy stores. |

Reflect on a time when you were confronted with a threatening or stressful situation. Do you remember feeling your heart beating quickly? Do you remember experiencing a rush of adrenaline? It is likely that the unconscious physiological responses of the sympathetic nervous system occurred as your body reacted to the threat or stressor. In lesson 3A Stress, you will learn about the flight-or-fight-or-freeze response, which is an involuntary response that occurs when a person is confronted by a threat or stressor. This response involves the unconscious physiological responses of the sympathetic nervous system, which were explained in table 2. Conversely, during a time when you were resting, it is likely that the unconscious physiological responses of the parasympathetic nervous system occurred as your body maintained optimal and balanced functioning.

Spinal reflex 3.1.1.5.2

Reflect on a time when you touched an extremely sharp object or an extremely hot surface. Did you pull back your hand very quickly? Did this withdrawal motion seem to happen automatically before you had consciously registered the painful sensation? This was likely the **spinal reflex**, which is an unconscious response to sensory stimuli that is initiated by interneurons in the spinal cord independently of the brain. Table 3 explains the steps involved in the spinal reflex, the green lines represent a sensory neural pathway and the red lines represent a motor neural pathway.

Table 3 The spinal reflex

| Step | Explanation | Example |
|------|---|--|
| 1 | A dangerous or harmful sensory stimulus is detected by sensory receptors, which transmit this sensory message via sensory neurons in the somatic nervous system to the spinal cord. | A person touches an extremely hot pan. This painful sensation is detected by their sensory receptors and transmitted via sensory neural pathways to the spinal cord.  |
| 2 | An interneuron in the spinal cord immediately relays this sensory neural signal from a sensory neuron to a motor neuron as a motor neural signal, initiating an automatic and unconscious motor response. | An interneuron in the spinal cord relays this sensory message from a sensory neuron to a motor neuron, initiating an unconscious motor response to quickly withdraw the hand from the extremely hot pan.  |
| 3 | The motor message is transmitted via motor neurons in the somatic nervous system to skeletal muscles, which carry out this unconscious motor response to the dangerous or harmful sensory stimulus. | Skeletal muscles in the person's hand automatically carry out this unconscious response, as the person withdraws their hand from the extremely hot pan.  |
| 4 | The sensory message continues to travel via afferent tracts in the spinal cord to the brain. Then, the brain independently registers the sensation that triggered the spinal reflex. | The person registers the painful sensation that caused them to withdraw their hand as the sensory message reaches their brain.  |

The path along which the neural signal is transmitted as part of the spinal reflex is called the **reflex arc**. The sensory neural message travels from sensory receptors to the spinal cord. It then loops around at the spinal cord, and, now as a motor neural message, travels from the spinal cord to skeletal muscles, which completes the reflex arc.

Spinal reflex

an unconscious response to sensory stimuli that is initiated by interneurons in the spinal cord independently of the brain

USEFUL TIP

As explained in step 4 in table 3, although the spinal reflex is initiated without conscious brain awareness, the brain does become aware of the sensation that triggered the spinal reflex. It consciously registers this sensation after the spinal reflex motor response has been initiated by interneurons in the spinal cord independently of the brain.

Reflex arc the path along which the neural signal is transmitted as part of the spinal reflex

USEFUL TIP

Some exam questions may require you to identify whether the response described in a scenario is conscious or unconscious. There are specific words to look out for that indicate the type of response. For example, imagine a scenario that describes a person withdrawing their hand after touching an object. If the scenario states that the person 'decides' to withdraw their hand, this implies that the response is conscious. By contrast, if the scenario states that the person 'immediately' withdraws their hand, this implies that the response is unconscious.

The spinal reflex occurs automatically and involuntarily. This unconscious response requires less processing than conscious responses because it is immediately initiated by the spinal cord in response to sensory stimuli, rather than consciously processed by the brain. Furthermore, the neural signal involved in the spinal reflex travels a shorter distance to the spinal cord than conscious responses do to the brain. In this way, the spinal reflex has evolved to protect humans from harm, enabling them to quickly and immediately respond to danger before they have even consciously registered it.

Theory summary

In this lesson, you learnt about how the divisions and subdivisions of the nervous system enable conscious and unconscious responses to internal and external sensory stimuli. Figure 2 summarises what you learnt in this lesson.

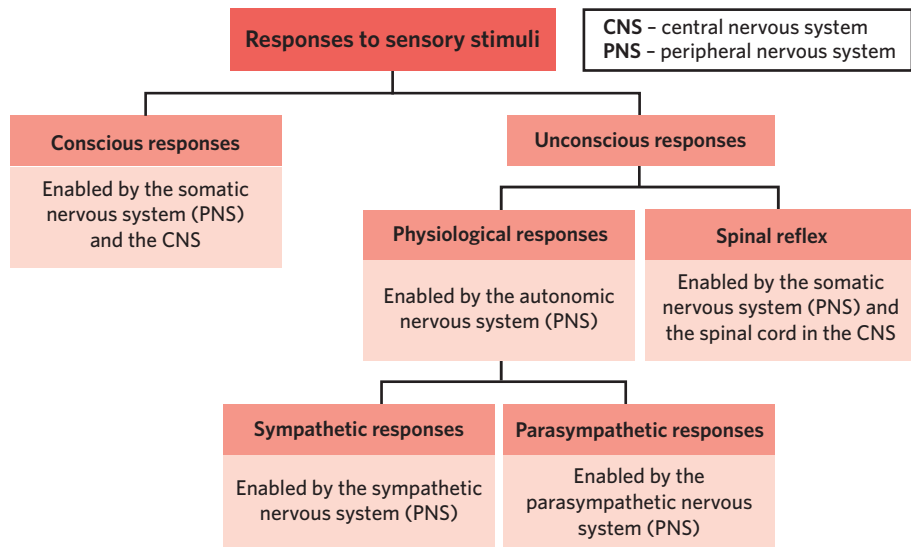


Figure 2 Summary of conscious and unconscious responses

2B Questions

Theory review

Question 1

Conscious responses are deliberate and voluntary actions that are initiated by the _____.

Which of the following best fills in the blank?

- A. spinal cord
- B. brain

Question 2

Which of the following divisions of the nervous system enable conscious responses? **(Select all that apply)**

- I. Somatic nervous system.
- II. Autonomic nervous system.
- III. Sympathetic nervous system.
- IV. Central nervous system.

Question 3

Unconscious responses are performed automatically and involuntarily in response to sensory stimuli.

- A. True.
- B. False.

Question 4

Unconscious _____ responses occur to maintain optimal and balanced functioning.

Which of the following best fills in the blank?

- A. sympathetic
- B. parasympathetic

Question 5

Which of the following are unconscious physiological responses that occur when the sympathetic nervous system is dominant? **(Select all that apply)**

- I. The bladder constricts.
- II. Breathing rate increases.
- III. Digestion is inhibited.
- IV. Heart rate decreases.

Question 6

Which of the following is an example of a spinal reflex?

- A. A person withdrawing their hand after touching a warm surface.
- B. A person withdrawing their hand after touching an extremely hot surface.

Question 7

The spinal reflex is initiated by _____ in the spinal cord.

Which of the following best fills in the blank?

- A. motor neurons
- B. sensory neurons
- C. interneurons

Question 8

The spinal reflex is a conscious response because the brain becomes aware of the sensation that triggered the spinal reflex.

- A. True.
- B. False.

Assessment skills

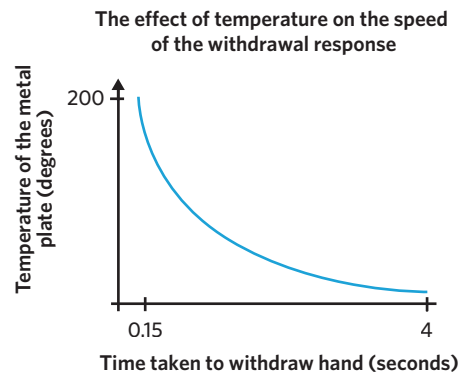
Data analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 9–14.

A neuroscientist conducted a research study that investigated the effect of the temperature of a sensory stimulus on the speed of the withdrawal response. The sample comprised 28 volunteers who responded to an advertisement published in a newspaper. Participants were instructed to touch a metal plate that was heated to a specific temperature. The time between the participant making contact with and removing their hand from the metal plate was recorded. This was repeated multiple times, with the temperature of the plate increasing by 10 degrees each trial. The following graph presents the results of this research study.



Question 9

Which sampling method was used in this research study?

- A. Random sampling.
- B. Stratified sampling.
- C. Convenience sampling.

Question 10

Which of the following best describes the results of the research study, which are presented in the graph?

- A. As the temperature of the metal plate increases, the time taken to withdraw the hand increases.
- B. As the temperature of the metal plate increases, the time taken to withdraw the hand decreases.

Question 11

Prior to conducting the research study, the neuroscientist hypothesised that the speed of the withdrawal response will increase as the temperature of the plate increases. Do the results of the research study support this hypothesis?

- A. Yes.
- B. No.

Question 12

The _____ the temperature of the metal plate, the _____ the likelihood of an individual experiencing a spinal reflex response.

Which of the following best fills in the blanks?

- A. higher; higher
- B. higher; lower

Question 13

When the metal plate is 200 degrees, it is likely that the participant will respond _____, whereas if the metal plate is 20 degrees, it is likely that the participant will respond _____.

Which of the following best fills in the blanks?

- A. consciously; unconsciously
- B. consciously; consciously
- C. unconsciously; unconsciously
- D. unconsciously; consciously

Question 14

Which of the following ethical principles was breached in this research study?

- A. Voluntary participation.
- B. No-harm principle.

Exam-style**Remember and understand****Question 15** (1 MARK)

Which of the following statements about conscious and unconscious responses is **not** correct?

- A. A conscious response of the nervous system is characterised by brain involvement.
- B. An unconscious response of the nervous system may occur automatically in response to dangerous or harmful sensory stimuli.
- C. A conscious response of the nervous system is involuntary and attention is directed towards the stimulus.
- D. An unconscious response of the nervous system may be regulated by the autonomic nervous system.

Adapted from VCAA Psychology exam 2020 Q2

Question 16 (1 MARK)

Which of the following correctly identifies a sympathetic response and a parasympathetic response?

| | Sympathetic response | Parasympathetic response |
|----|--|---|
| A. | The body releases less glucose | Bladder constricts |
| B. | Heart rate increases | Adrenal glands do not secrete stress hormones |
| C. | Adrenal glands secrete stress hormones | Pupils dilate |
| D. | Pupils constrict | Breathing rate increases |

Question 17 (1 MARK)

The spinal reflex is

- A. a survival response that is initiated by interneurons in the brain.
- B. a conscious response that is initiated by the spinal cord.
- C. a voluntary response to dangerous or harmful stimuli.
- D. an unconscious response to sensory stimuli that is initiated by interneurons in the spinal cord.

Adapted from VCAA Psychology exam 2018 Q1

Question 18 (2 MARKS)

Outline one similarity and one difference between conscious motor responses to sensory stimuli and the spinal reflex.

Question 19 (4 MARKS)

Describe how the nervous system could coordinate the conscious response of putting on a jacket after feeling the cold weather.

Apply and analyse

Question 20 (1 MARK)

Zahara is trying to learn how to sew. She borrows needles and thread from her mother and attempts to sew colourful stitches into the hem of her dress. Suddenly, she accidentally pricks her finger with the needle and immediately withdraws her hands. Her finger begins to bleed as she cries to her mother that she never wants to sew again!

Zahara's withdrawal response is an example of

- A. an unconscious response, because it occurred immediately and automatically.
- B. an unconscious response, because it was involuntarily initiated by Zahara's brain.
- C. a conscious response, because it occurred independently of the brain.
- D. a conscious response, because it was voluntarily initiated by Zahara's spinal cord.

Question 21 (2 MARKS)

Jesse is grocery shopping in the supermarket when he suddenly sees his English teacher in one of the aisles. He feels his heart pounding in his chest and his breathing becoming heavier as he remembers that he did not submit an essay that was due yesterday. He decides to avoid his English teacher, turning around and walking into the neighbouring aisle.

Identify an example of a conscious response in the scenario provided. Justify why this is an example of a conscious response.

Question 22 (5 MARKS)

Violet was playing in the garden when she felt something crawl onto her leg. She saw that it was a large ant and brushed it away with her hand. Suddenly, she involuntarily kicked out her leg and then felt a stinging sensation, causing her to cry out in pain. She realised that the ant had bitten her leg!

- a. Identify a division of the nervous system that was involved when Violet brushed the ant off her leg. Identify the type of response that this was. (2 MARKS)

Division: _____

Response: _____

- b. Name and explain the response that occurred when Violet kicked out her leg. Justify why Violet kicking out her leg is an example of this response. (3 MARKS)

Adapted from VCAA Psychology exam 2017 Q4

Questions from multiple lessons

Use the following information to answer questions 23 and 24.

Silas is celebrating his birthday with his friends. There are balloons at the party and Silas' friends think it will be funny to scare Silas by popping a balloon close to his ear. The loud noise startled Silas, causing him to leap out of his chair. However, he quickly realised that the noise was just his friends up to their usual tricks and sat back down in his chair.

Question 23 (1 MARK)

The role of Silas' autonomic nervous system when he heard the loud noise of the balloon popping was to

- A. maintain the optimal and balanced functioning of visceral muscles, organs, and glands.
- B. increase Silas' heart rate and decrease Silas' breathing rate.
- C. ensure that the brain activates visceral muscles, organs, and glands.
- D. quickly initiate a response to a dangerous or threatening stimulus.

Adapted from VCAA Psychology exam 2018 Q6

Question 24 (1 MARK)

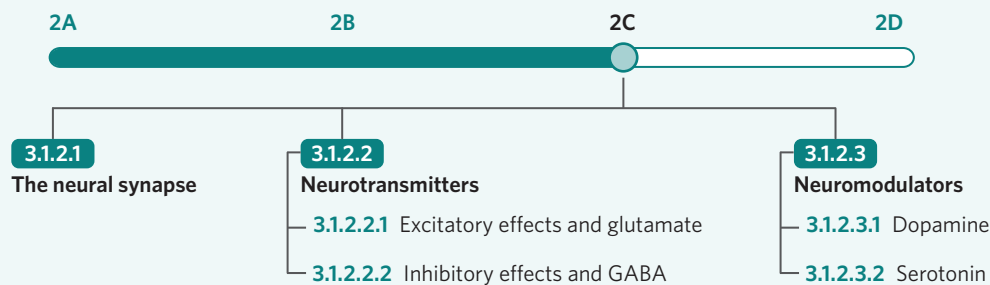
Which division of Silas' nervous system would have become dominant when Silas sat back down in his chair after realising that the loud noise was not dangerous?

- A. Central nervous system.
- B. Sympathetic nervous system.
- C. Parasympathetic nervous system.
- D. Somatic nervous system.

2C Neurotransmitters and neuromodulators

STUDY DESIGN DOT POINT

- the role of neurotransmitters in the transmission of neural information across a neural synapse to produce excitatory effects (as with glutamate) or inhibitory effects (as with gamma-amino butyric acid [GABA]) as compared to neuromodulators (such as dopamine and serotonin) that have a range of effects on brain activity



Every second of every day, chemical molecules are released in your brain, enabling the transmission of neural signals along neural pathways. This chemical activity is how neurons communicate with each other across the neural synapse, and more broadly, how your brain functions. In this way, everything you do is ultimately due to these minuscule chemical molecules.

In this lesson, you will learn about the role of neurochemicals in the transmission of neural information across the neural synapse. Specifically, you will learn about neurotransmitters, including glutamate and GABA, and neuromodulators, including dopamine and serotonin.



The neural synapse 3.1.2.1

Before learning about the neurochemicals that are released into the neural synapse, it is important to first learn about what a neural synapse is.

Theory details

As you have learnt, neurons are arranged in neural pathways in the nervous system along which neural messages are transmitted. Two neurons in a neural pathway meet at the **neural synapse**, which is the region that includes the axon terminals of the presynaptic neuron, the synaptic gap, and the dendrites of the postsynaptic neuron:

- The **presynaptic neuron** is the neuron that releases neurochemicals into the neural synapse.
 - Axon terminals (also known as terminal buttons)** are the ends of a neuron that release neurochemicals into the neural synapse. Axon terminals stem from the axon, which is the long projection of a neuron, and contain synaptic vesicles, which are sacs that store neurochemicals.
- The **synaptic gap** is the space between the presynaptic neuron and the postsynaptic neuron. In this way, despite being very close, neurons do not touch each other.
- The **postsynaptic neuron** is the neuron that receives neurochemicals from the neural synapse.
 - Dendrites** are branched extensions of a neuron on which receptor sites are located.
 - Receptor sites** are protein molecules on the dendrites of a neuron that receive neurochemicals.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Neural synapse

the region that includes the axon terminals of the presynaptic neuron, the synaptic gap, and the dendrites of the postsynaptic neuron

Presynaptic neuron

the neuron that releases neurochemicals into the neural synapse

Axon terminal (also known as terminal button)

the end of a neuron that releases neurochemicals into the neural synapse

Synaptic gap the space between the presynaptic neuron and the postsynaptic neuron

Postsynaptic neuron the neuron that receives neurochemicals from the neural synapse

Dendrite a branched extension of a neuron on which receptor sites are located

Receptor site a protein molecule on the dendrites of a neuron that receives neurochemicals

Neurochemical a chemical substance that transmits neural information within the nervous system

Synaptic transmission the chemical conveyance of neural information between two neurons across a neural synapse

Figure 1 presents two neurons in a neural pathway meeting at the neural synapse, including associated structures.

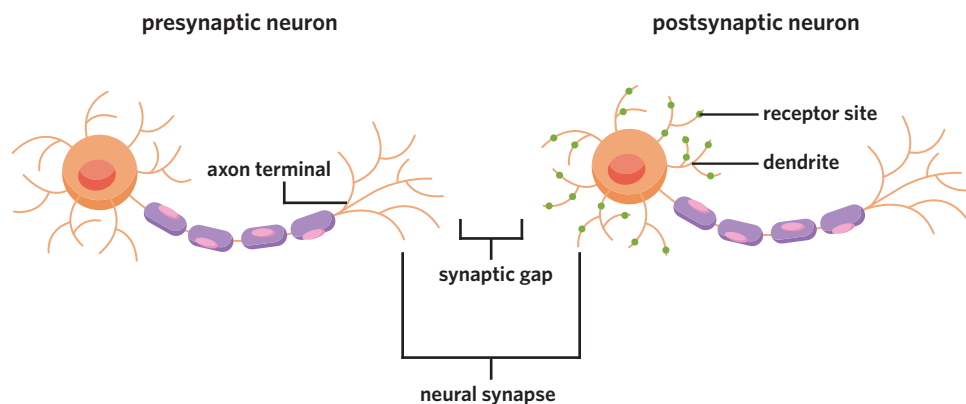


Figure 1 The neural synapse

Neurochemicals are chemical substances that transmit neural information within the nervous system. Neurochemicals are released by the presynaptic neuron and affect the postsynaptic neuron. In this way, these chemical substances enable **synaptic transmission**, which is the chemical conveyance of neural information between two neurons across a neural synapse. In other words, neurons communicate with one another through the release of neurochemicals. The process of synaptic transmission is as follows:

1. Neurochemicals are produced in the axon terminals of the presynaptic neuron.
2. Neurochemicals are released from the axon terminals of the presynaptic neuron into the synaptic gap.
3. Neurochemicals bind to receptor sites on the dendrites of the postsynaptic neuron.
4. Neurochemicals affect the postsynaptic neuron, either triggering or inhibiting a response.

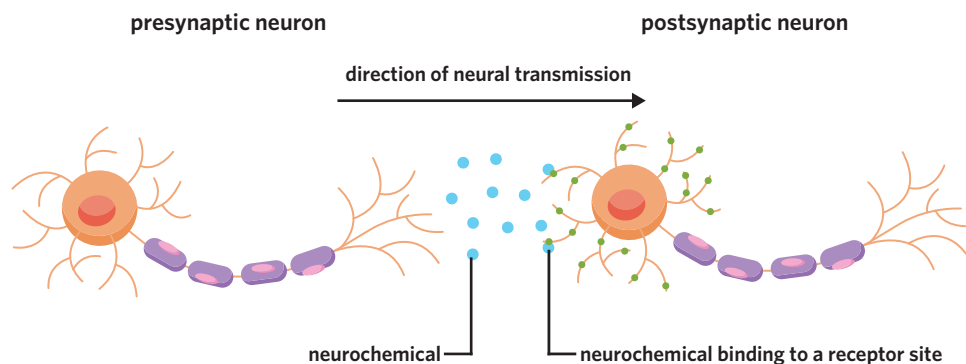


Figure 2 The process of synaptic transmission

Each neurochemical has a distinct molecular structure that corresponds to a specific receptor site. A neurochemical can only bind to the corresponding receptor site that matches its specific molecular structure. It cannot bind to the receptor sites of other neurochemicals because these receptor sites do not match its specific molecular structure, just as other neurochemicals cannot bind to its receptor site.

USEFUL TIP

The lock-and-key analogy, which is presented in figure 3, may help you conceptualise how neurochemicals bind to their corresponding receptor sites on the dendrites of the postsynaptic neuron.

The 'key' represents a neurochemical and the 'lock' represents the receptor site. In this way, just as a specific key can only enter its corresponding lock to open the door, a specific neurochemical can only bind to its corresponding receptor site to affect the postsynaptic neuron and 'unlock' a response. Furthermore, no other 'keys' can enter this specific 'lock', just as no other neurochemicals can bind to this specific receptor site, demonstrating the concept of receptor specificity.

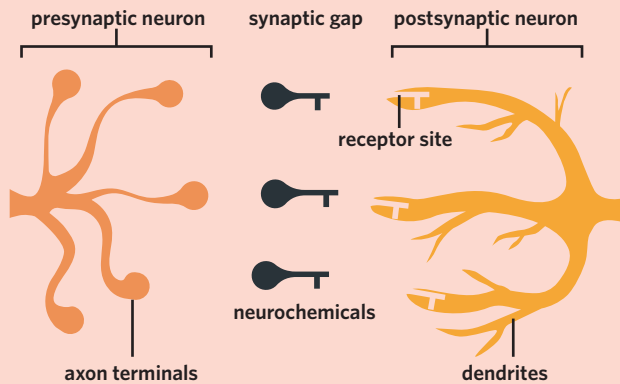


Figure 3 The lock-and-key analogy

WANT TO KNOW MORE?**Neural transmission as an electrochemical process**

This lesson focuses on synaptic transmission, which involves the release of neurochemicals into the neural synapse to chemically transmit neural information. However, the transmission of neural information along neural pathways is an electrochemical process, meaning it involves electrical signals and chemical signals. While the VCAA study design only requires you to know about the chemical signals, also learning about the electrical signals may help you understand the complete process of neural transmission.

Neurochemicals bind to receptor sites and have an effect on the postsynaptic neuron (chemical transmission). The postsynaptic neuron becomes either more or less likely to fire an action potential, which is an electrical impulse that travels down the axon of a neuron (electrical transmission). The firing of an action potential triggers the release of neurochemicals from the axon terminals of this neuron, which is now the presynaptic neuron, into the synaptic gap (chemical transmission). This electrochemical transmission continues along the neural pathway, as electrical signals are transmitted within neurons and chemical signals are transmitted between neurons.

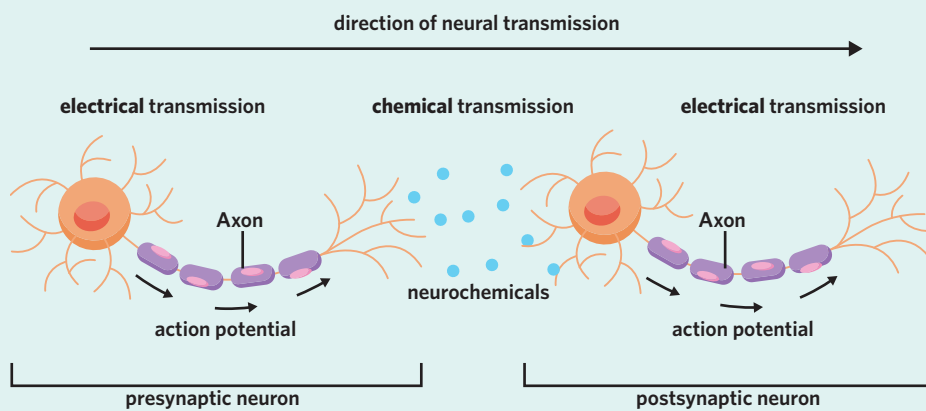


Figure 4 Neural transmission is an electrochemical process

The neurochemicals that you will learn about in the following sections of this lesson are:

- neurotransmitters
- neuromodulators.

Neurotransmitters 3.1.2.2

Neurotransmitters are extremely important for normal brain functioning, despite being small in size and affecting only one or two postsynaptic neurons. You will learn about neurotransmitters in this section of the lesson.

Theory details

Neurotransmitter

a chemical molecule that has an effect on one or two postsynaptic neurons

Action potential

an electrical impulse that travels down the axon of a neuron

Excitatory effect

when the neurotransmitter increases the likelihood of the postsynaptic neuron firing an action potential

Glutamate

the main excitatory neurotransmitter in the nervous system

Inhibitory effect

when the neurotransmitter decreases the likelihood of the postsynaptic neuron firing an action potential

GABA (gamma-aminobutyric acid)

the main inhibitory neurotransmitter in the nervous system

USEFUL TIP

It is important to understand that excitatory and inhibitory neurotransmitters merely increase or decrease the likelihood of the postsynaptic neuron firing an action potential. Their respective excitatory or inhibitory effects are not guaranteed when they bind to their corresponding receptor sites.

Neurotransmitters are chemical molecules that have an effect on one or two postsynaptic neurons. This type of neurochemical enables rapid communication between two neurons across the neural synapse.

There are two types of neurotransmitters:

- Excitatory neurotransmitters, which have an excitatory effect on the postsynaptic neuron.
- Inhibitory neurotransmitters, which have an inhibitory effect on the postsynaptic neuron.

Both inhibitory and excitatory neurotransmitters bind to their corresponding receptor sites on the dendrites of the postsynaptic neuron. The difference is the effect that they have on the postsynaptic neuron. Inhibitory and excitatory neurotransmitters have different influences on the likelihood of the postsynaptic neuron firing an **action potential**, which is an electrical impulse that travels down the axon of a neuron.

Excitatory effects and glutamate 3.1.2.2.1

An **excitatory effect** is when the neurotransmitter increases the likelihood of the postsynaptic neuron firing an action potential. Excitatory effects occur when an excitatory neurotransmitter binds to receptor sites on the dendrites of the postsynaptic neuron. They enhance neural transmission along neural pathways by activating postsynaptic neurons.

Glutamate is the main excitatory neurotransmitter in the nervous system. Glutamate is explained in table 1.

Table 1 Glutamate

| | Glutamate |
|----------------------------|--|
| Type | Excitatory neurotransmitter |
| Effect | Increases the likelihood of the postsynaptic neuron firing an action potential |
| Role in functioning | Glutamate has an important role in learning and memory. Specifically, the excitatory effects of glutamate form and strengthen synaptic connections between neurons that are repeatedly activated during learning. These strong synaptic connections represent memories of what has been learnt. In this way, glutamate enables synaptic plasticity, which you will learn about in the next lesson of this chapter. Glutamate also has an important role in thought and movement. |

Inhibitory effects and GABA 3.1.2.2.2

An **inhibitory effect** is when the neurotransmitter decreases the likelihood of the postsynaptic neuron firing an action potential. Inhibitory effects occur when an inhibitory neurotransmitter binds to receptor sites on the dendrites of the postsynaptic neuron. They suppress neural transmission from occurring along neural pathways by regulating the activation of postsynaptic neurons.

GABA (gamma-aminobutyric acid) is the main inhibitory neurotransmitter in the nervous system. GABA is explained in table 2.

Table 2 GABA

| | GABA |
|----------------------------|---|
| Type | Inhibitory neurotransmitter |
| Effect | Decreases the likelihood of the postsynaptic neuron firing an action potential |
| Role in functioning | GABA has an important role in regulating postsynaptic activation in neural pathways, preventing the overexcitation of neurons. In this way, GABA reduces anxiety, which is a physiological and psychological response that involves general feelings of worry and apprehension, by inhibiting excitatory neural signals that contribute to anxiety. Furthermore, by inhibiting the uncontrolled firing of action potentials, GABA has an important role in preventing seizures. |

USEFUL TIP

It is a common misconception that inhibitory effects are negative because they slow the transmission of neural information. However, it is important to understand that both excitatory and inhibitory effects are important for optimal brain functioning.

Postsynaptic neurons in neural pathways would fire uncontrollably without the inhibitory effects of GABA counterbalancing the excitatory effects of glutamate, potentially causing anxiety and seizures. Conversely, postsynaptic neurons in neural pathways would not be adequately stimulated and activated without the excitatory effects of glutamate counterbalancing the inhibitory effects of GABA, potentially causing learning and concentration difficulties, and mental exhaustion. Figure 5 demonstrates the importance of neurotransmitter levels remaining balanced for optimal brain functioning.

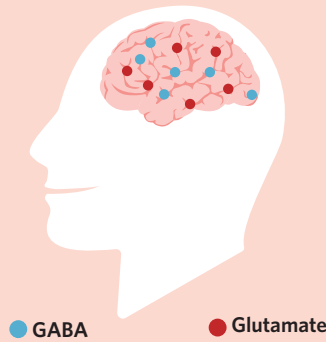


Figure 5 Balanced levels of excitatory and inhibitory neurotransmitters in the brain are important for optimal brain functioning

Neuromodulators 3.1.2.3

As the name suggests, neuromodulators have a modulatory role in the brain, influencing neural activity on a larger and slower scale than neurotransmitters. You will learn about neuromodulators in this section of the lesson.

Theory details

Neuromodulators are chemical molecules that have an effect on multiple postsynaptic neurons. This type of neurochemical modulates neural activity on a larger scale than neurotransmitters. This is because neuromodulators are released into multiple neural synapses and consequently affect multiple postsynaptic neurons, unlike neurotransmitters, as demonstrated in figure 6. Therefore, neuromodulators have widespread modulatory effects as they can influence large areas of brain tissue. Furthermore, the action of neuromodulators produces relatively long-lasting effects, as they modulate neural activity more slowly than neurotransmitters. However, like neurotransmitters, neuromodulators must bind to their specific receptor sites to have an effect on groups of postsynaptic neurons.

Neuromodulator

a chemical molecule that has an effect on multiple postsynaptic neurons

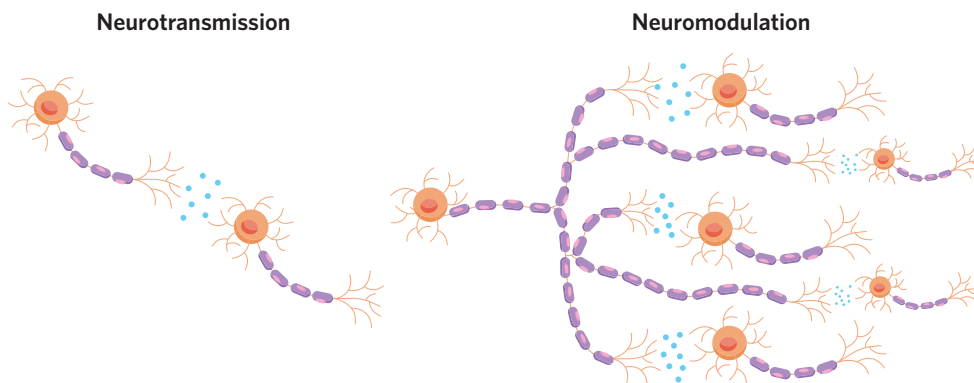


Figure 6 Neurotransmitters affect one or two postsynaptic neurons, whereas neuromodulators affect multiple postsynaptic neurons

Neuromodulators can also modulate the effects of neurotransmitters by:

- changing the responsiveness of the receptor sites of a particular neurotransmitter, enhancing the excitatory or inhibitory effects of neurotransmitters.
- changing the neurotransmitter release pattern of the presynaptic neuron.

There are two neuromodulators that you will learn about in the following sections of the lesson:

- dopamine
- serotonin.

Dopamine

a neuromodulator primarily responsible for voluntary motor movement, the experience of pleasure, and reward-based learning

Dopamine 3.1.2.3.1

Dopamine is a neuromodulator primarily responsible for voluntary motor movement, the experience of pleasure, and reward-based learning. Dopamine is explained in table 3.

Table 3 Dopamine

| Dopamine | |
|----------------------------|--|
| Pathways | <p>There are pathways in the brain along which dopamine is transmitted. These pathways originate from regions that produce dopamine, including:</p> <ul style="list-style-type: none"> • the substantia nigra, which is located in the midbrain. • the ventral tegmental area, which is located in the midbrain. |
| Effect | <p>Dopamine can have excitatory and inhibitory effects on the postsynaptic neuron. The effect dopamine has depends on the type of receptor sites present at the particular brain location.</p> |
| Role in functioning | <ul style="list-style-type: none"> • Dopamine has an important role in coordinating voluntary motor movement. Dopamine produced in the substantia nigra transmits neural information that enables smooth, coordinated muscle movement. • Dopamine has an important role in reward-based learning. When a person is rewarded for doing a behaviour, dopamine produced in the ventral tegmental area is released, which is associated with the experience of pleasure. Behaviours that may cause the release of dopamine include any behaviour that receives a reward. Examples of rewards include money, food, sex, and virtual prizes in an online game. • Dopamine also has a role in motivation, given its role in reward-based learning. Rewarding behaviours that trigger the release of dopamine have a pleasurable consequence for the person and are therefore more likely to be repeated. In this way, dopamine can motivate the person to engage in rewarding behaviours to experience pleasure once again. This explains why the release of dopamine is associated with addiction. Addictive behaviours, such as gambling or drug use, often provide an intensely pleasurable reward to the person, motivating them to repeat the behaviour, which consequently contributes to addiction. |

WANT TO KNOW MORE?

As you have learnt, dopamine produced in the substantia nigra has an important role in coordinating voluntary motor movement. When the loss of neurons occurs in the substantia nigra, dopamine production, and therefore dopamine levels in the brain, are reduced. This contributes to the development of Parkinson's disease, which is a neurodegenerative disease that impacts neural messages related to voluntary motor movement. Motor symptoms of Parkinson's disease include:

- slowness of movement
- muscle rigidity
- uncontrollable and involuntary shaking (tremors)
- difficulty starting and stopping body movements
- difficulty balancing
- stooped posture.

This impeded motor function that is characteristic of Parkinson's disease can be treated by medication that artificially increases levels of dopamine in the brain, given that dopamine is the neuromodulator that functions to coordinate voluntary motor movement.

Serotonin 3.1.2.3.2

Serotonin is a neuromodulator primarily responsible for the regulation of mood and sleep. Serotonin is explained in table 4.

Table 4 Serotonin

| Serotonin | |
|----------------------------|--|
| Pathways | There are pathways in the brain along which serotonin is transmitted. These pathways originate from the raphe nuclei, which are masses of neurons in the brainstem that produce serotonin. |
| Effect | Serotonin has inhibitory effects on the postsynaptic neuron. |
| Role in functioning | <ul style="list-style-type: none"> Serotonin has an important role in mood regulation and stabilisation. Appropriate levels of serotonin in the brain enable a person to experience positive and stable moods, promoting wellbeing. Low levels of serotonin in the brain are associated with mental disorders, including depression. Depression is characterised by prolonged negative moods, diminished interest or pleasure in daily activities, and feelings of worthlessness and inappropriate or excessive guilt (American Psychiatric Association, 2013). This demonstrates the role of serotonin in regulating mood and explains why some medications used to treat depression increase serotonin levels or target serotonin receptors in the brain. Serotonin has an important role in regulating the sleep-wake cycle, which is the 24-hour period comprising time spent asleep and time spent awake. In this way, serotonin influences your quality and quantity of sleep at night, as well as feelings of alertness and wakefulness during the day. Serotonin has various other roles depending on the receptor types it binds to and the brain area it acts upon, including appetite, digestion, and arousal. |

Serotonin
a neuromodulator primarily responsible for the regulation of mood and sleep

Theory summary

In this lesson, you learnt about the role of neurochemicals in the transmission of neural information across the neural synapse. Figure 7 summarises what you learnt in this lesson.

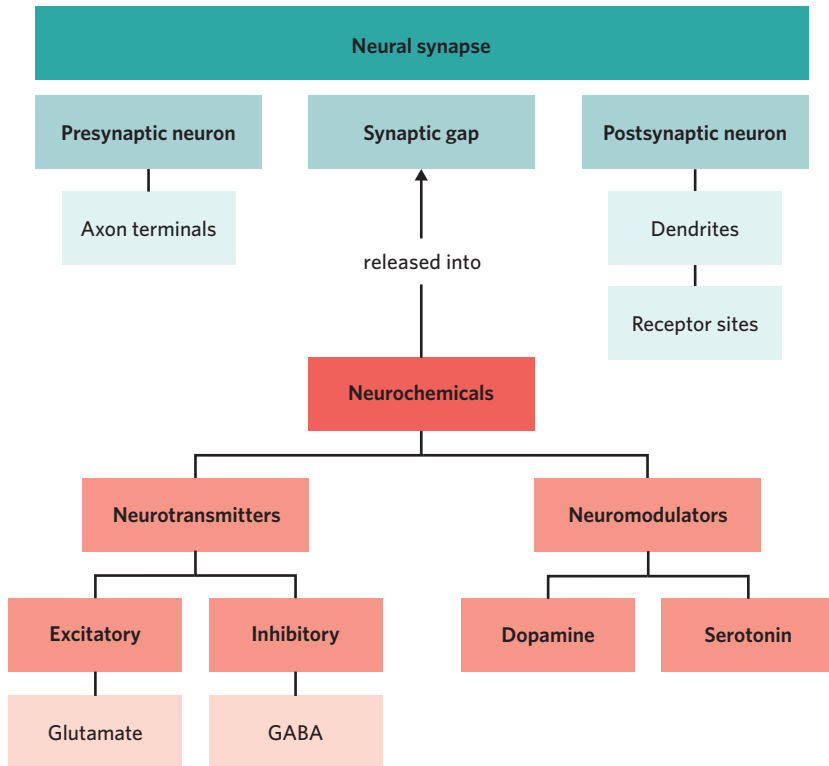


Figure 7 Summary of lesson 2C

2C Questions

Theory review

Question 1

The transmission of neural information across a neural synapse occurs _____.

Which of the following best fills in the blank?

- A. chemically
- B. electrically

Question 2

Which of the following structures is included in the neural synapse? **(Select all that apply)**

- I. The synaptic gap.
- II. The axon terminals of the postsynaptic neuron.
- III. The axon terminals of the presynaptic neuron.
- IV. The dendrites of the postsynaptic neuron.

Question 3

Any neurochemical can bind to any receptor site on the dendrites of the postsynaptic neuron.

- A. True.
- B. False.

Question 4

Which of the following is **not** a substance released into the neural synapse by the presynaptic neuron?

- A. Neurotransmitter.
- B. Neuromodulator.
- C. Hormone.

Question 5

A neurotransmitter with an excitatory effect _____ the likelihood of the postsynaptic neuron firing an action potential.

Which of the following best fills in the blank?

- A. increases
- B. decreases

Question 6

The inhibitory effects of neurotransmitters negatively impact brain functioning because they slow the transmission of neural information.

- A. True.
- B. False.

Question 7

Which of the following are neuromodulators? **(Select all that apply)**

- I. Glutamate.
- II. Dopamine.
- III. GABA.
- IV. Serotonin.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

The _____ neuron releases neurochemicals into the neural synapse, whereas the _____ neuron receives neurochemicals from the neural synapse.

Which of the following best fills in the blanks?

- A. releasing; receiving
- B. postsynaptic; presynaptic
- C. presynaptic; postsynaptic

Question 9

Which of the following is an accurate statement?

- A. Glutamate is an inhibitory neurotransmitter, whereas GABA is an excitatory neurotransmitter.
- B. Both glutamate and GABA can have excitatory and inhibitory effects on the postsynaptic neuron depending on which receptor sites they bind to.
- C. When glutamate binds to its corresponding receptor sites, the postsynaptic neuron is more likely to fire an action potential.
- D. When GABA binds to its corresponding receptor sites, the postsynaptic neuron is guaranteed not to fire an action potential.

Question 10

A similarity between neurotransmitters and neuromodulators is that

- A. both must bind to their specific receptor sites on the dendrites of the postsynaptic neuron to have their effects on this neuron.
- B. both affect multiple postsynaptic neurons when released by the presynaptic neuron.
- C. both affect one or two postsynaptic neurons when released by the presynaptic neuron.

Question 11

Dopamine has only excitatory effects on the postsynaptic neuron, whereas serotonin has only inhibitory effects on the postsynaptic neuron.

- A. True.
- B. False.

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 12 and 13.

Elouise is a 65-year-old woman who lives alone. Over recent months, Elouise has felt sad almost every day for apparently no reason at all. She struggles to get out of bed in the morning and no longer looks forward to her weekly catchup with Anne, her best friend. Anne notices that Elouise has been experiencing negative moods and encourages her to visit the doctor, who diagnoses Elouise with moderate depression.

Question 12

The diagnosis of depression indicates that there may be inappropriate levels of a _____ in Elouise's brain.

Which of the following best fills in the blank?

- A. neurotransmitter
- B. neuromodulator

Question 13

Which of the following is a medication that the doctor may prescribe Elouise to treat her depression?

- A. A medication that decreases the level of serotonin in the brain.
- B. A medication that increases the level of dopamine in the brain.
- C. A medication that decreases the level of glutamate in the brain.
- D. A medication that increases the level of serotonin in the brain.

Exam-style**Remember and understand****Question 14** (1 MARK)

Glutamate plays an important role in synaptic transmission by

- A. acting as an excitatory neurotransmitter across a neural synapse.
- B. acting as an excitatory neuromodulator across a neural synapse.
- C. acting as an inhibitory neurotransmitter across a neural synapse.
- D. acting as an inhibitory neuromodulator across a neural synapse.

Adapted from VCAA Psychology exam 2017 Q4

Question 15 (1 MARK)

Which of the following correctly identifies the effect of GABA on the postsynaptic neuron?

| | Effect | Explanation |
|----|------------|---|
| A. | Excitatory | Decreases the likelihood of the postsynaptic neuron firing an action potential. |
| B. | Inhibitory | Decreases the likelihood of the postsynaptic neuron firing an action potential. |
| C. | Excitatory | Increases the likelihood of the postsynaptic neuron firing an action potential. |
| D. | Inhibitory | Increases the likelihood of the postsynaptic neuron firing an action potential. |

Question 16 (2 MARKS)

Explain one similarity and one difference between neurotransmitters and neuromodulators.

Question 17 (2 MARKS)

Outline two roles of serotonin in functioning.

Question 18 (3 MARKS)

With reference to glutamate, describe the process involved in the successful transmission of neural information across a neural synapse.

Adapted from VCAA Psychology exam 2018 Q1

Apply and analyse

Use the following information to answer questions 19 and 20.

Dalia has recently been diagnosed with epilepsy. She has experienced several epileptic seizures and has recently been prescribed medication to help control their occurrence. Dalia's brother, Tim, has been feeling extremely anxious since his sister was diagnosed with epilepsy. He experiences constant worry that Dalia may die from an epileptic seizure and is also extremely concerned that he would not know what to do if she had a seizure in front of him.

Question 19 (1 MARK)

With reference to GABA, Dalia's epileptic seizures are most likely due to

- A. an excess of this excitatory neurotransmitter.
- B. an excess of this inhibitory neurotransmitter.
- C. a deficiency of this excitatory neurotransmitter.
- D. a deficiency of this inhibitory neurotransmitter.

Adapted from VCAA Psychology exam 2017 Q15

Question 20 (1 MARK)

Tim's anxiety is most likely due to

- A. too much neural transmission.
- B. not enough neural transmission.
- C. the overexcitation of postsynaptic neurons.
- D. the absence of inhibitory neural transmission.

Question 21 (3 MARKS)

Explain how dopamine may contribute to addiction.

Evaluate

Question 22 (3 MARKS)

Both excitatory and inhibitory effects are important for optimal brain functioning. Justify whether or not you agree with this statement.

Questions from multiple lessons

Question 23 (3 MARKS)

Gabriella is in her Psychology class when her teacher reminds students that they have an assessment due in two days. Gabriella has previously been diagnosed with anxiety by a psychologist and also completely forgot about this assessment. She feels extremely panicked upon being reminded about the assessment, and some of her anxiety symptoms, such as breathlessness and catastrophic thoughts, become apparent.

- a. In relation to her diagnosis of anxiety, name the dysfunctional neurochemical in Gabriella's brain, and identify whether this neurochemical is at lower or higher levels than normal. (2 MARKS)
- b. Identify the division of Gabriella's autonomic nervous system that was likely activated when Gabriella was reminded about the upcoming assessment. (1 MARK)

2D Synaptic plasticity

STUDY DESIGN DOT POINT

- synaptic plasticity – resulting from long-term potentiation and long-term depression, which together act to modify connections between neurons (sprouting, rerouting and pruning) – as the fundamental mechanism of memory formation that leads to learning

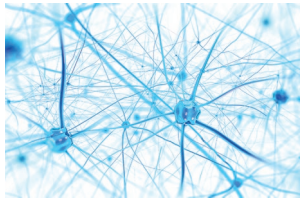
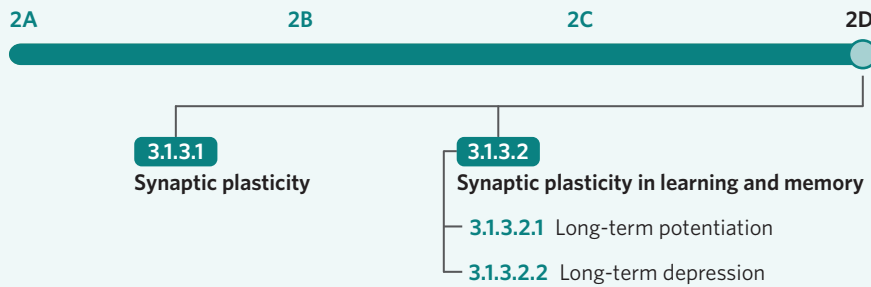


Image: Andrii Vodolazhskiy/Shutterstock

When you form memories or learn new information, physical changes occur in your brain. Specifically, neural synapses are modified and synaptic connections are changed, enabling new information to be encoded and stored in your brain.

In this lesson, you will learn about synaptic plasticity. Specifically, you will learn about long-term potentiation and long-term depression as fundamental mechanisms of learning and memory.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Synaptic plasticity
the ability of synaptic connections to change over time in response to activity or experience

Synaptic plasticity 3.1.3.1

In the previous lesson, you learnt about the neural synapse. In this section of the lesson, you will learn about the physical changes that occur to neural synapses, known as synaptic plasticity.

Theory details

Synaptic plasticity is the ability of synaptic connections to change over time in response to activity or experience. These changes include the formation, strengthening, or weakening of synaptic connections. In other words, the experiences that you have throughout your lifespan modify the neural synapses in your brain, causing them to physically change.

WANT TO KNOW MORE?

As you have learnt, synaptic plasticity is the ability of neural synapses to change in response to activity and experience throughout one's lifespan. More broadly, neuroplasticity is the ability of the brain to change in response activity and experience. In this way, synaptic plasticity is a form of neuroplasticity that specifically relates to neural synapses.

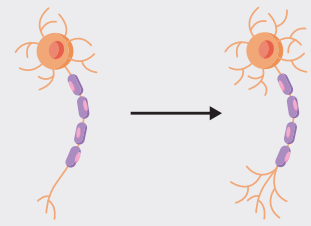
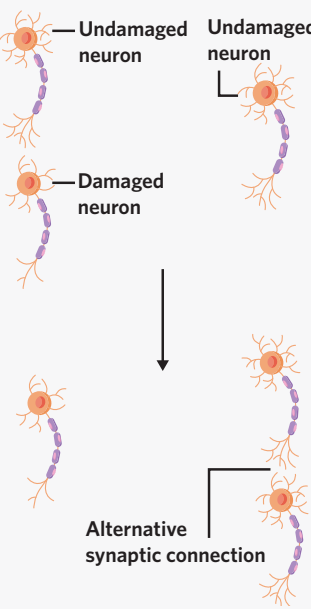
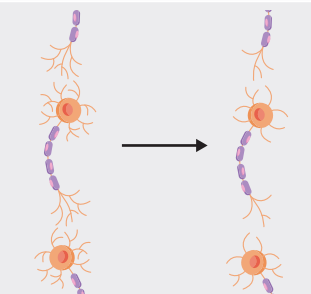
Other than synaptic plasticity, other examples of neuroplasticity include:

- the formation of new neurons
- increase in brain size or brain mass
- changes to where particular functions are performed in the brain.

There are mechanisms of synaptic plasticity that involve changes being made to a synaptic connection between two neurons. These mechanisms are how neural synapses physically change in response to activity and experience. There are three mechanisms of synaptic plasticity that are explained in table 1, which are:

- sprouting
- rerouting
- pruning.

Table 1 Mechanisms of synaptic plasticity

| Mechanism | Explanation | Diagram |
|------------------|--|--|
| Sprouting | Sprouting is the ability of dendrites or axons to develop new extensions or branches. This increases the reach of the neuron and enables the formation of new synaptic connections. |  <p>Figure 1 Sprouting</p> |
| Rerouting | Rerouting is the ability of a neuron that is connected to a damaged neuron to create an alternative synaptic connection with an undamaged neuron. The neuron abandons its synaptic connection with the damaged neuron and forms a new synaptic connection with an undamaged neuron. The synaptic connection is reestablished via an alternative route, restoring brain functioning. |  <p>Figure 2 Rerouting</p> |
| Pruning | Pruning is the elimination of synaptic connections that are not adequately activated. When neural synapses are not used, they are removed or 'pruned'. This is necessary to accommodate stronger and more essential synaptic connections, consequently enhancing the efficiency of brain functioning. |  <p>Figure 3 Pruning</p> |

USEFUL TIP

You may have played with plasticine or playdough in your younger years, moulding and modelling the malleable and colourful clay into various shapes. Plasticine is changeable, just as 'plasticity' relates to the ability to change. This memory device that compares plasticine to plasticity may help you remember that synaptic plasticity specifically relates to the ability of neural synapses to change.

Sprouting the ability of dendrites or axons to develop new extensions or branches

Rerouting the ability of a neuron that is connected to a damaged neuron to create an alternative synaptic connection with an undamaged neuron

Pruning the elimination of synaptic connections that are not adequately activated

USEFUL TIP

To help understand what happens during pruning, it may help to remember the phrase 'use it or lose it'. The less that a synaptic connection between two neurons is activated (used), the more likely that this synaptic connection will be eliminated (lost).

WANT TO KNOW MORE?

There are two types of experiences that may cause synaptic connections to change:

1. Synaptic connections may change in response to ageing and maturation, which is known as developmental plasticity.
2. Synaptic connections may change in response to brain trauma or injury, which is known as adaptive plasticity.

Pruning is a mechanism related to developmental plasticity. For example, despite occurring throughout one's lifespan, pruning occurs most intensely during infancy and adolescence, as synaptic connections that are no longer adequately activated are eliminated. This enables the brain to form stronger and more essential synaptic connections, promoting brain development. In some areas of the brain, the density of synaptic connections of a two-year-old is more than double that of an adult (Huttenlocher, 1990).

In comparison, sprouting and rerouting are mechanisms related to adaptive plasticity. For example, if a person sustains a brain injury that damages neurons, sprouting enables new synaptic connections to form. Furthermore, rerouting replaces ineffective synaptic connections with effective synaptic connections, enabling the formation of alternative synaptic pathways for effective neural transmission. This enables brain functioning to gradually recover following the injury.

You learnt about sprouting, rerouting, and pruning in the context of developmental plasticity and adaptive plasticity in **Units 1&2 Psychology**. However, this lesson focuses on these mechanisms of synaptic plasticity in the context of learning and memory.

Synaptic plasticity in learning and memory 3.1.3.2

Most people broadly understand what it means to learn or remember something. They learn new information and form new memories every day, often without giving much thought to the neural mechanisms behind these processes. In this section of the lesson, you will learn about synaptic plasticity as the fundamental mechanism of learning and memory.

Theory details

Learning is the process of acquiring knowledge, skills, or behaviours through experience.

Memory is the process of encoding, storing, and retrieving information that has been previously encountered. Learning and memory are extremely important processes that constantly occur throughout your life. You learn new information and form new memories every day as you experience, engage, and interact with your environment. This knowledge that you acquire and possess helps determine who you are as a person. Given their fundamental nature, many scientists and psychologists have sought to understand the neural mechanisms that underlie the processes of learning and memory.

Synaptic plasticity is the fundamental mechanism of memory formation that leads to learning. When you form new memories, neural synapses in your brain physically change in response to these experiences. These changes to synaptic connections establish neural pathways that incorporate these memories and represent what has been learnt. These neural pathways that form during learning are referred to as memory traces, with each memory trace representing a different memory. Figure 4 presents an example of a memory trace being formed due to synaptic plasticity as a person learns how to ride a bike.

Learning the process of acquiring knowledge, skills, or behaviours through experience

Memory the process of encoding, storing, and retrieving information that has been previously encountered

USEFUL TIP

The term 'coactivated' means 'activated together'. In figure 4, this may mean that the neural pathway associated with balance and the neural pathway associated with the motor movement of pedalling the bike are activated at the same time, strengthening these synaptic connections. As these neural pathways are activated at the same time, it is helpful to use the term 'coactivated' when describing this process.

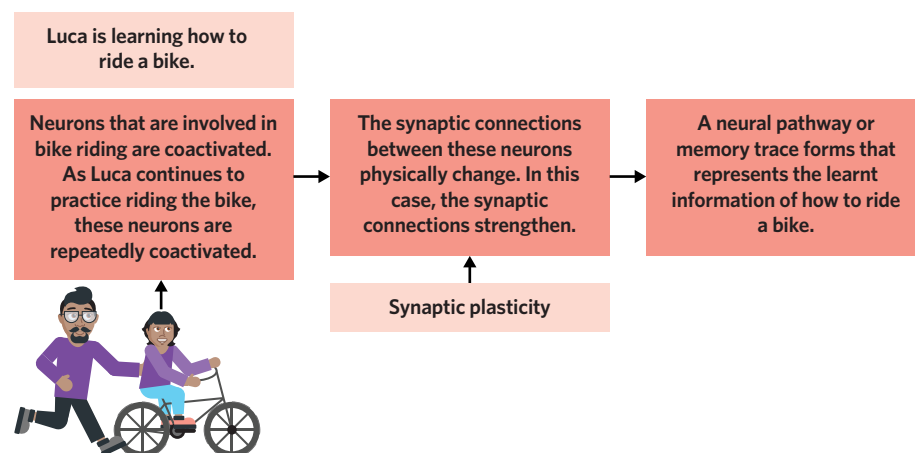


Figure 4 An example of the formation of a memory trace due to synaptic plasticity

There are two forms of synaptic plasticity that underlie learning and memory. These are:

- long-term potentiation
- long-term depression.

Long-term potentiation and long-term depression involve the long-lasting strengthening or weakening of synaptic connections in neural pathways in response to increased or decreased coactivation. These forms of synaptic plasticity work together to maintain an optimal number of synaptic connections, and therefore neural pathways, in the brain. This ensures that the brain can effectively encode learnt information and establish new memory traces, promoting learning and memory. You will learn about long-term potentiation and long-term depression in the following sections of the lesson.

Long-term potentiation 3.1.3.2.1

Long-term potentiation is the long-lasting and experience-dependent strengthening of synaptic connections that are regularly coactivated. It is an experience-dependent form of synaptic plasticity because neural synapses are strengthened in response to frequent and repeated use during learning and memory.

During learning and memory, neurotransmitters are repeatedly released into the synaptic gap by the axon terminals of the presynaptic neuron and received by receptor sites on the dendrites of the postsynaptic neuron. This repeated coactivation of the presynaptic neuron and postsynaptic neuron, or this repeated high-intensity stimulation of the postsynaptic neuron, strengthens the synaptic connection between these neurons.

The increased strength of synaptic connections involves structural changes occurring to the neural synapse. These structural changes are the result of the increased release of neurotransmitters, specifically glutamate, into the neural synapse due to long-term potentiation. Structural changes include:

- increased number of receptor sites on the dendrites of the postsynaptic neuron.
- bushier dendrites on the postsynaptic neuron due to sprouting.
- increased number of synaptic connections between neurons due to sprouting.

Figure 5 presents the changes that occur to a neural synapse due to long-term potentiation, and the subsequent strengthening of a synaptic connection.

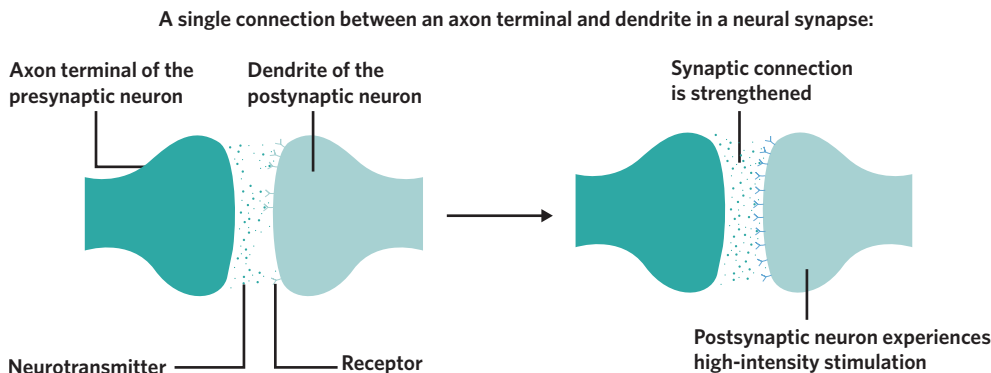


Figure 5 Long-term potentiation

The increased strength of synaptic connections in a neural pathway makes postsynaptic neurons more receptive to neural signals from presynaptic neurons and consequently more readily activated. This increases the efficiency of synaptic transmission along the neural pathway. In this way, when this specific neural pathway is activated once again, neural signals are transmitted more rapidly and efficiently.

LESSON LINK

In lesson **2C Neurotransmitters and neuromodulators**, you learnt that glutamate has an important role in synaptic plasticity, and therefore learning and memory. Specifically, you learnt that the excitatory effects of glutamate strengthen synaptic connections between neurons that are repeatedly coactivated. Expanding upon this, the release of glutamate into the neural synapse enables this neural synapse to undergo structural changes, such as an increased number of receptor sites. These structural changes strengthen the synaptic connection between the presynaptic neuron and the postsynaptic neuron, increasing the excitability of the postsynaptic neuron. In this way, glutamate has an important role in long-term potentiation.

Long-term potentiation

the long-lasting and experience-dependent strengthening of synaptic connections that are regularly coactivated

USEFUL TIP

To help understand what happens during long-term potentiation, it may help to remember the phrase 'neurons that fire together, wire together'. The more that two neurons are coactivated at the neural synapse (firing together), the stronger their synaptic connection will become (wiring together) and the more effective neural transmission will become at this neural synapse.

Long-term depression is the long-lasting and experience-dependent weakening of synaptic connections between neurons that are not regularly coactivated.

USEFUL TIP

You may have noticed the terms 'sprouting' and 'pruning' reappear in the context of long-term potentiation and long-term depression. This is because sprouting is a mechanism of synaptic plasticity that occurs during long-term potentiation and pruning is a mechanism of synaptic plasticity that occurs during long-term depression.

Long-term depression 3.1.3.2.2

Long-term depression is the long-lasting and experience-dependent weakening of synaptic connections between neurons that are not regularly coactivated. It is an experience-dependent form of synaptic plasticity because neural synapses are weakened in response to infrequent use.

If a neural pathway that has been previously established during learning and memory is no longer regularly activated, long-term depression weakens the synaptic connections in this neural pathway that is no longer necessary. The weakening of a neural synapse involves the infrequent release of neurotransmitters into the synaptic gap by the axon terminals of the presynaptic neuron. This low-intensity stimulation of the postsynaptic neuron weakens the synaptic connection between the presynaptic neuron and the postsynaptic neuron.

The decreased strength of synaptic connections involves structural changes occurring to the neural synapse. These structural changes are a result of the decreased release of neurotransmitters into the neural synapse due to long-term depression. Structural changes include:

- decreased number of receptor sites on the dendrites of the postsynaptic neuron.
- decreased number of dendrites on the postsynaptic neuron due to pruning.
- decreased number of synaptic connections between neurons due to pruning.

Figure 6 presents the changes that occur to a neural synapse due to long-term depression, and the subsequent weakening of a synaptic connection.

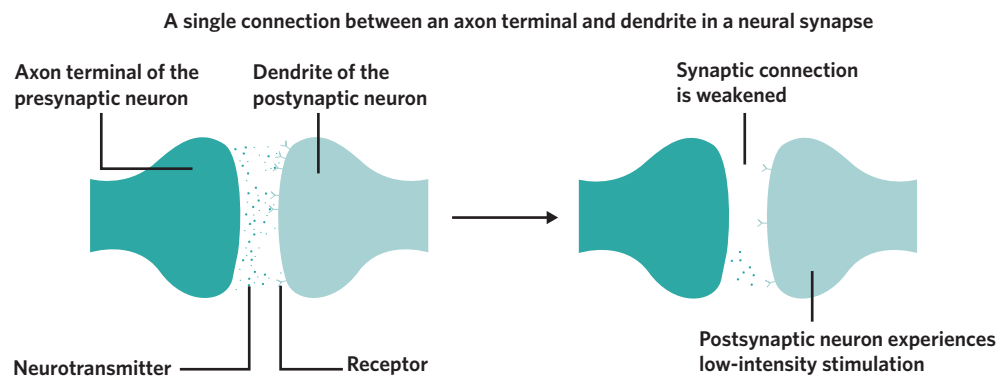


Figure 6 Long-term depression

The decreased strength of synaptic connections in a neural pathway makes postsynaptic neurons less receptive to neural signals from presynaptic neurons and consequently less readily activated. This decreases the efficiency of synaptic transmission along the neural pathway.

By weakening memory traces that are not regularly activated, long-term depression enables the brain to accommodate more necessary memory traces that represent more relevant information, and are consequently activated more frequently. In this way, long-term depression regulates the number of synaptic connections in the brain, ensuring an optimal number is present for learning and memory. Furthermore, it is important to understand that these weakened memory traces can be restrengthened through long-term potentiation if they are later reactivated.

Now that you have learnt about long-term potentiation and long-term depression, it is important to be able to apply these forms of synaptic plasticity to examples of learning and memory. Figure 7 presents an example of long-term potentiation and long-term depression occurring as someone plays an instrument.

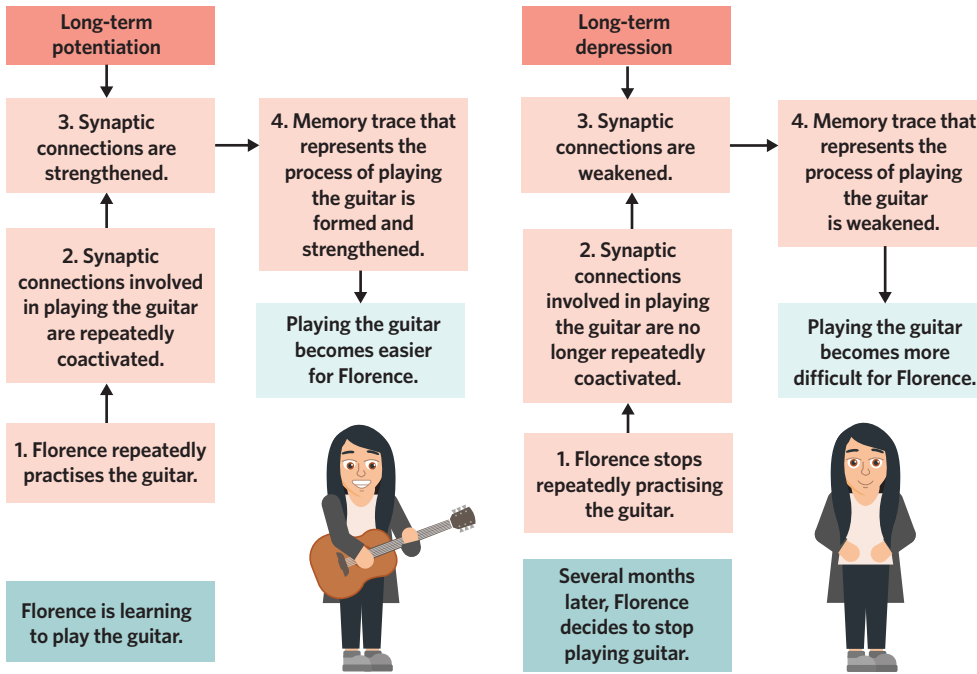


Figure 7 An example of long-term potentiation and long-term depression in the context of learning and memory

Theory summary

In this lesson, you learnt about synaptic plasticity, including its role in learning and memory. Figure 8 summarises what you learnt in this lesson.

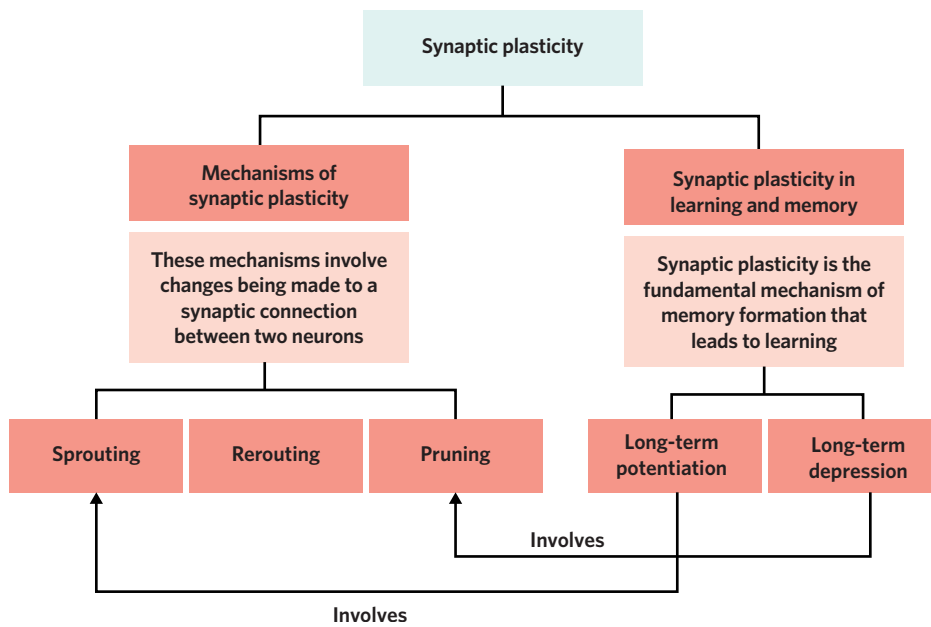


Figure 8 Summary of lesson 2D

2D Questions

Theory review

Question 1

The experiences that you have in your life can cause the neural synapses in your brain to physically change.

- A. True.
- B. False.

Question 2

Which of the following are mechanisms of synaptic plasticity? **(Select all that apply)**

- I. Sprouting.
- II. Trimming.
- III. Rerouting.

Question 3

Pruning is a mechanism of synaptic plasticity that negatively impacts brain functioning because it eliminates useful synaptic connections that are regularly activated.

- A. True.
- B. False.

Question 4

Long-term potentiation and long-term depression respectively involve the _____ and _____ of synaptic connections between neurons.

Which of the following best fills in the blanks?

- A. strengthening; weakening
- B. weakening; strengthening

Question 5

Long-term depression _____ the efficiency of synaptic transmission along a neural pathway.

Which of the following best fills in the blank?

- A. increases
- B. decreases

Question 6

Long-term potentiation is the only form of synaptic plasticity that is important for learning and memory.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 7

Which of the following sentences is most correct?

- A. Synaptic plasticity is the ability of **the brain** to change over time in response to activity or experience.
- B. Synaptic plasticity is the ability of **synaptic connections** to change over time in response to activity or experience.

Question 8

Which of the following sentences is most correct?

- A. Long-term potentiation and long-term depression involve the respective high-intensity and low-intensity stimulation of **postsynaptic neurons**.
- B. Long-term potentiation and long-term depression involve the respective high-intensity and low-intensity stimulation of **neural pathways**.

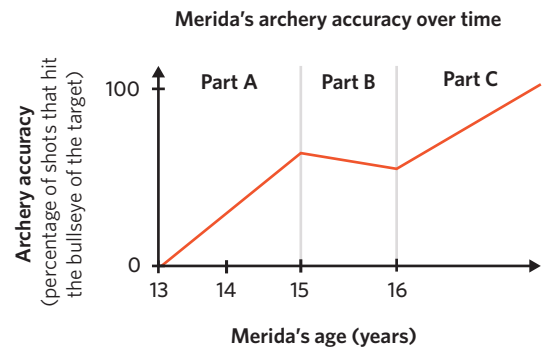
Data analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 9–12.

When Merida was 13 years old, she told her mother that she wanted to learn archery. Despite her mother expressing that she would rather Merida practise more 'useful' skills, such as sewing, Merida picked up a bow and arrow and practised archery every day. Over the next two years, her archery accuracy gradually improved. However, when Merida was 15 years old, her mother sent her to a boarding school, where she could not practice archery. When she returned home one year later, she found that she could not hit the target like she used to. She refused to go back to boarding school and again practised archery every day. Once again, her archery accuracy improved until she could hit the bullseye of the target almost every time.

**Question 9**

In what way is the data presented?

- A. Table.
- B. Bar chart.
- C. Line graph.

Question 10

What form of synaptic plasticity is occurring for Merida during part A and part C?

- A. Long-term potentiation.
- B. Long-term depression.

Question 11

During part B, the neural pathway in Merida's brain that represents archery skills

- A. was regularly activated and therefore increased in strength.
- B. was regularly activated and therefore decreased in strength.
- C. was not regularly activated and therefore increased in strength.
- D. was not regularly activated and therefore decreased in strength.

Question 12

Which mechanism of synaptic plasticity was likely occurring in Merida's brain during part B?

- A. Sprouting.
- B. Rerouting.
- C. Pruning.

Exam-style

Remember and understand

Question 13 (1 MARK)

Which of the following statements about synaptic plasticity is correct?

- A. Synaptic plasticity only involves the strengthening of neural synapses.
- B. Synaptic plasticity only occurs during infancy.
- C. Synaptic plasticity involves structures within neurons physically changing in response to activity or experience.
- D. Synaptic plasticity involves structures between neurons physically changing in response to activity or experience.

Adapted from VCAA Psychology sample exam 2017 Q7

Question 14 (1 MARK)

Which of the following correctly describes a mechanism of synaptic plasticity?

| | Mechanism | Explanation |
|----|-----------|--|
| A. | Sprouting | The elimination of synaptic connections that are not adequately activated. |
| B. | Rerouting | The ability of a neuron that is connected to a damaged neuron to create an alternative synaptic connection with an undamaged neuron. |
| C. | Pruning | The death of neurons that are not adequately activated. |
| D. | Rerouting | The ability of dendrites or axons to develop new extensions or branches, forming new synaptic connections. |

Question 15 (2 MARKS)

Describe synaptic plasticity and its role in learning and memory.

Question 16 (2 MARKS)

Outline one similarity and one difference between long-term potentiation and long-term depression.

Question 17 (2 MARKS)

Identify and explain two changes that occur to a neural synapse due to long-term depression.

Adapted from VCAA Psychology exam 2015 Q2

Apply and analyse

Use the following information to answer questions 18–20.

When Dami was a child, his favourite thing was to perform card tricks on his friends and family. He spent many hours practising challenging card shuffling techniques until he could perform them flawlessly. As an adult, Dami was no longer interested in card shuffling or card tricks because he had other priorities, such as his job and his partner, Indiyah. However, Dami is now a father of two children, Paige and Gemma, and decides that he would like to show them some of the card shuffling techniques he once knew. Dami notices that while he isn't as good as he used to be at card shuffling, the skill has come back to him relatively quickly.

Question 18 (1 MARK)

A change that likely occurred to neural synapses in the neural pathway representing card shuffling when Dami was regularly practising card shuffling techniques as a child is

- A. bushier dendrites on the postsynaptic neuron due to sprouting.
- B. a decreased number of dendrites on the postsynaptic neuron due to pruning.
- C. a decreased number of receptor sites on the dendrites of the postsynaptic neuron.
- D. an increased number of synaptic connections between neurons due to pruning.

Adapted from VCAA Psychology exam 2013 Q3

Question 19 (1 MARK)

Which process likely occurred to synaptic connections in the neural pathway representing card shuffling when Dami became disinterested in card shuffling as an adult?

- A. Long-term potentiation.
- B. Short-term depression.
- C. Long-term depression.
- D. Sprouting.

Question 20 (1 MARK)

Which of the following best describes why Dami was able to pick up card shuffling relatively quickly as an adult?

- A. The mechanisms of synaptic plasticity, especially pruning, occur.
- B. New neurons were created to form new neural pathways.
- C. Previously formed synaptic connections were weakened.
- D. Previously formed synaptic connections were strengthened.

Question 21 (2 MARKS)

Duncan is the leader of a technology company and is always interested in ways to improve the efficiency of his employees as they do their work. Duncan read an article that described a new typing method that increases typing accuracy and speed. He asked his employees to use this new typing method throughout the next two months and see whether their typing speed and accuracy improves.

Explain the role of long-term potentiation and long-term depression when Duncan's employees learn the new typing method over two months.

Adapted from VCAA Psychology sample exam 2017 Q4a

Question 22 (2 MARKS)

Doctor Holland wanted to investigate long-term depression. Specifically, she wanted to understand how much time it takes for synaptic connections that are not regularly activated to be eliminated from a neural pathway. To investigate this, Doctor Holland used neuroimaging techniques on rats to obtain scans of their brains.

Can Doctor Holland generalise the results of this experiment to humans? Justify your response.

Question 23 (3 MARKS)

Synaptic plasticity only involves the formation of new synaptic connections.

Do you agree or disagree with this statement? Justify your response.

Questions from multiple lessons

Question 24 (1 MARK)

Which of the following statements about glutamate is incorrect?

- A. Glutamate has an important role in synaptic plasticity, and therefore learning and memory.
- B. Glutamate is an excitatory neurotransmitter that increases the likelihood of the postsynaptic neuron firing an action potential.
- C. Long-term depression involves a greater release of glutamate into the neural synapse than long-term potentiation.
- D. The release of glutamate into the neural synapse enables structural changes to occur that strengthen the synaptic connection.

Adapted from VCAA Psychology exam 2017 Q4

Chapter 2 review

Chapter summary

In this chapter, you learnt about how the nervous system functions.

In lesson **2A The nervous system**, you learnt about the divisions and subdivisions of the nervous system. Specifically, you learnt about:

- the central nervous system
 - brain
 - spinal cord
- the peripheral nervous system
 - somatic nervous system
 - autonomic nervous system
 - sympathetic nervous system
 - parasympathetic nervous system.

In lesson **2B Conscious and unconscious responses**, you learnt about how the divisions and subdivisions of the nervous system enable you to consciously and unconsciously respond to sensory stimuli. Specifically, you learnt about:

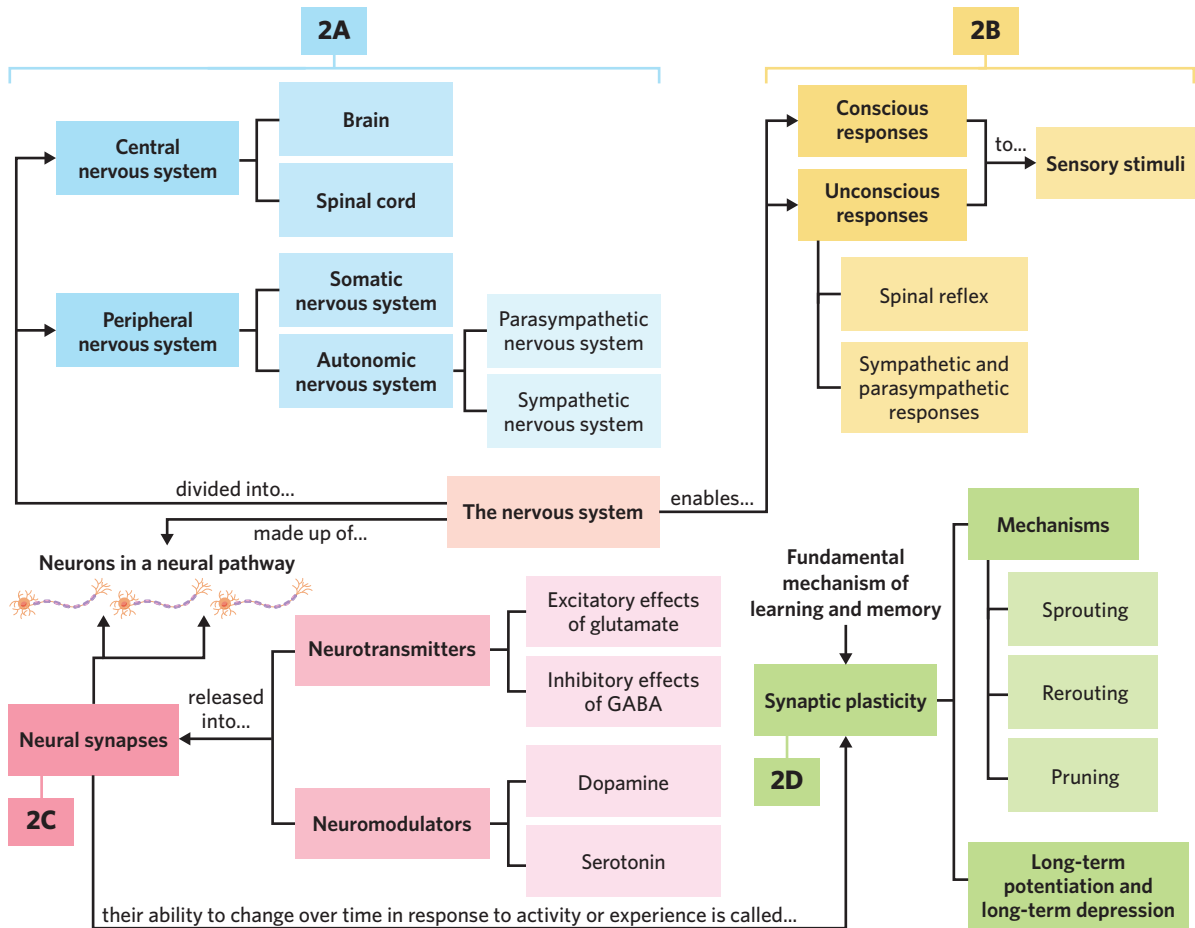
- conscious responses to sensory stimuli
- unconscious responses to sensory stimuli
 - physiological responses of the autonomic nervous system
 - sympathetic responses
 - parasympathetic responses
 - spinal reflex.

In lesson **2C Neurotransmitters and neuromodulators**, you learnt about the role of neurotransmitters and neuromodulators in the transmission of neural information across the neural synapse. Specifically, you learnt about:

- the process of synaptic transmission across a neural synapse
- neurotransmitters
 - the excitatory effects of glutamate
 - the inhibitory effects of GABA
- neuromodulators
 - dopamine
 - serotonin.

In lesson **2D Synaptic plasticity**, you learnt about synaptic plasticity as the fundamental mechanism of learning and memory. Specifically, you learnt about:

- mechanisms of synaptic plasticity
 - sprouting
 - rerouting
 - pruning
- synaptic plasticity in learning and memory
 - long-term potentiation
 - long-term depression.



Chapter review activities

Review activity 1: Fill in the table

In chapter 2, you learnt about how the divisions and subdivisions of the nervous system enable you to consciously and unconsciously respond to sensory stimuli. Copy out and fill in the tables with the steps involved in conscious and unconscious responses. Furthermore, fill in the tables with the divisions and subdivisions of the nervous system involved in each step.

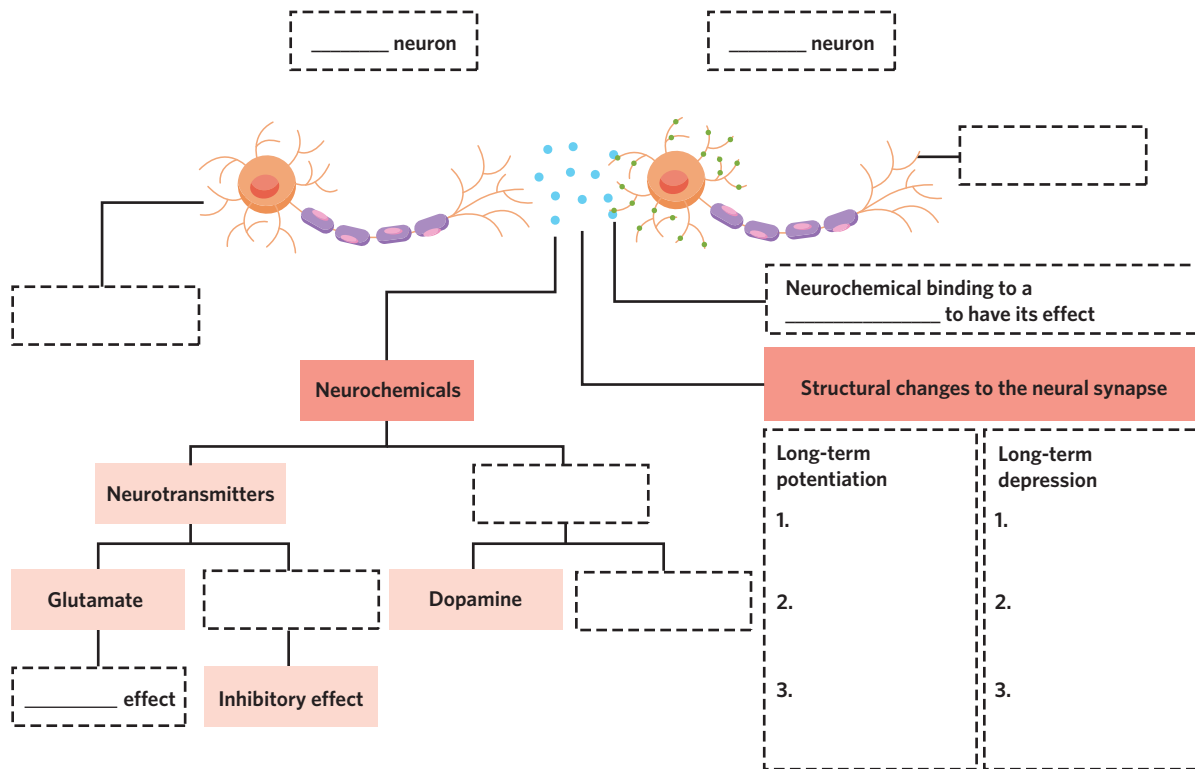
| Conscious responses | Step | Explanation | Nervous system divisions and subdivisions |
|---------------------|------|-------------|---|
| | 1. | | |
| | 2. | | |
| | 3. | | |
| | 4. | | |
| | 5. | | |

| Unconscious responses | Step | Explanation | Nervous system divisions and subdivisions |
|-----------------------|------|-------------|---|
| | 1. | | |
| | 2. | | |
| | 3. | | |
| | 4. | | |

Review activity 2: Fill in the diagram

In chapter 2, you learnt about the process of synaptic transmission, which involves the release of neurotransmitters and neuromodulators into the neural synapse. You also learnt about synaptic plasticity, which involves synaptic connections physically changing over time in response to activity or experience. The diagram below summarises this knowledge.

1. Copy the diagram into your notes and fill in the blanks.
2. Draw an arrow that indicates the direction of neural transmission.
3. Draw a circle around the neural synapse.



Chapter 2 test

Multiple choice

Question 1 (1 MARK)

An excitatory neurochemical that binds to its corresponding receptor sites

- A. increases the likelihood of the presynaptic neuron firing an action potential.
- B. increases the likelihood of the postsynaptic neuron firing an action potential.
- C. decreases the likelihood of the presynaptic neuron firing an action potential.
- D. decreases the likelihood of the postsynaptic neuron firing an action potential.

Use the following information to answer questions 2 and 3.

On Tessa's birthday, her best friend took her to a fancy restaurant for dinner. Afterwards, Tessa wanted to visit her favourite bar, but her best friend insisted that they go back to Tessa's house first. When Tessa entered the house, the lights suddenly switched on and all her friends jumped out from behind the furniture, singing 'happy birthday'. Tessa screamed and felt her heart pounding in her chest because her friends scared her. However, she quickly recovered from this initial shock and clapped through the rest of the song, before searching for wine glasses in her cupboard and sitting down on the couch with her friends.

Question 2 (1 MARK)

A physiological response of the autonomic nervous system that Tessa may have experienced when her friends jumped out from behind furniture was

- A. a relaxed bladder.
- B. decreased heart rate.
- C. constricted lung airways.
- D. decreased release of glucose.

Question 3 (1 MARK)

The role of Tessa's autonomic nervous system when she sat down on the couch was to

- A. ensure that her brain reduces the activity of visceral muscles, organs, and glands.
- B. dilate her pupils and decrease her breathing rate.
- C. return her body to optimal and balanced functioning once the threat is no longer present.
- D. quickly initiate a response to a dangerous or threatening stimulus.

Adapted from VCAA Psychology exam 2018 Q6

Question 4 (1 MARK)

Which of the following correctly identifies a role of a neuromodulator in functioning?

| | Neuromodulator | Role in functioning |
|----|----------------|--|
| A. | Glutamate | Regulating and stabilising mood |
| B. | Dopamine | Coordinating voluntary motor movement |
| C. | GABA | Preventing seizures by inhibiting the uncontrolled firing of action potentials |
| D. | Serotonin | Enabling synaptic plasticity by forming and strengthening synaptic connections between neurons |

Question 5 (1 MARK)

Some medications used to treat depression increase serotonin levels to an appropriate level in the brain. This is because

- A. appropriate levels of serotonin in the brain enable a person to experience positive and unstable moods.
- B. high levels of serotonin in the brain are associated with mental disorders, including depression.
- C. serotonin acts as a neuromodulator, not a neurotransmitter.
- D. appropriate levels of serotonin in the brain help regulate and stabilise mood.

Short answer**Question 6** (2 MARKS)

Describe one similarity and one difference between the somatic nervous system and the autonomic nervous system.

Question 7 (2 MARKS)

Andrew and Tasha have been dating for several years now. Andrew decides it is finally time to propose to Tasha and takes her on a picnic overlooking the city lights. Right before Andrew asks Tasha to marry him, he feels his heart pounding in his chest and his body sweating profusely. Despite his nerves, Andrew bends down on one knee, reaches into his pocket, presents Tasha with a glistening diamond ring, and asks her if she will marry him.

Identify an example of an unconscious response in the scenario provided. Justify why this is an example of an unconscious response.

Question 8 (3 MARKS)

Pruning and sprouting are two mechanisms of synaptic plasticity.

- a. Explain what is meant by pruning and sprouting. (2 MARKS)
- b. Outline one difference between pruning and sprouting. (1 MARK)

Question 9 (1 MARK)

Explain one role of glutamate in neurological functioning.

Question 10 (3 MARKS)

When long-term potentiation occurs, this promotes learning and memory. Conversely, when long-term depression occurs, this does not promote learning and memory.

Do you agree or disagree with this statement? Justify your response.

Question 11 (3 MARKS)

With reference to GABA, describe the process involved in the successful transmission of neural information across a neural synapse.

Adapted from VCAA Psychology exam 2018 Q1

Question 12 (5 MARKS)

When Adam learnt to swing a cricket bat as a child, he stepped forward with his left foot as he swung. As a young adult, Adam joins a local cricket team and attends a training session. The coach notices that Adam is stepping forward with his left foot, which reduces the power of his swing, and instructs Adam to practice stepping forward with his right foot. Adam practices this until it becomes natural for him to step forward with his right foot as he swings the cricket bat.

- a. Explain how long-term depression is involved when Adam learns to step forward with his right foot as he swings the cricket bat. (3 MARKS)

Adapted from VCAA Psychology exam 2020 Q3a

- b. Outline two changes that may have occurred to neural synapses in Adam's brain involved in stepping forward with his right foot. (2 MARKS)

Question 13 (10 MARKS)

Ayalah is on holiday with her family and is having a horrible time. She writes in her diary about her negative experiences so far:

Dear diary,

What a disaster this holiday has been! So much has gone wrong that I don't even know where to begin. Firstly, I lost all my luggage at the airport, which had all my favourite clothes in it. I honestly felt so stressed when I realised it was not on the baggage carousel. To make matters worse, my younger brother kept joking that I might have to go everywhere naked! To my relief, my luggage was found several hours later and we could finally leave the airport... in the early hours of the morning.

As if that was not bad enough, we were walking through a forest yesterday and I stopped to take a picture of the landscape. Suddenly, I was jumping up and down and smacking my legs. I then realised that I had been standing on an ant mound and that these ants were now biting my legs. The pain was unbearable! Once again, my brother laughed at my expense, so I decided to hit him on the arm to shut him up. Then my parents yelled at me for causing trouble. How unfair!

I cannot wait for this nightmare of a holiday to be over.

Discuss the role of the nervous system in Ayalah's negative experiences during her holiday. Your discussion should consider conscious and unconscious responses, and the divisions and subdivisions of the nervous system that enabled these responses.

3



CHAPTER 3

Stress as a psychobiological process

LESSONS

- 3A** Stress
- 3B** Selye's General Adaptation Syndrome
- 3C** Lazarus and Folkman's Transactional Model of Stress and Coping
- 3D** The gut-brain axis
- 3E** Coping with stress

KEY KNOWLEDGE

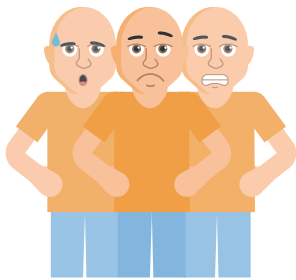
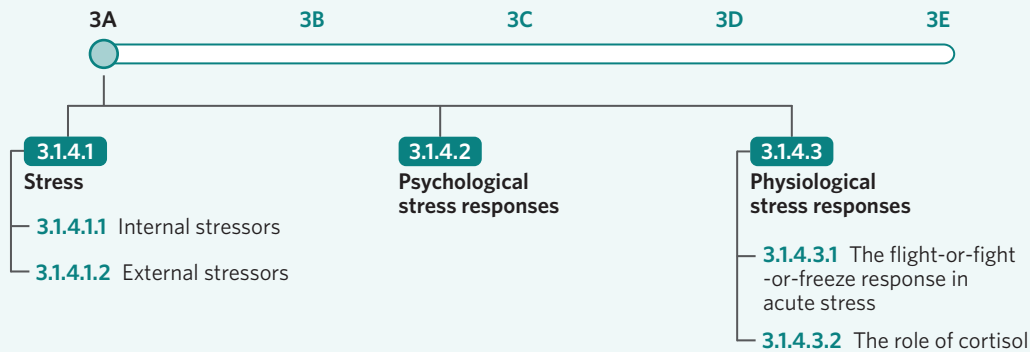
- internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress
- the explanatory power of Hans Selye's General Adaptation Syndrome as a biological model of stress, including alarm reaction (shock/counter shock), resistance and exhaustion
- the explanatory power of Richard Lazarus and Susan Folkman's Transactional Model of Stress and Coping to explain stress as a psychological process (primary and secondary appraisal only)
- the gut-brain axis (GBA) as an area of emerging research, with reference to the interaction of gut microbiota with stress and the nervous system in the control of psychological processes and behaviour
- use of strategies (approach and avoidance) for coping with stress and improving mental wellbeing, including context-specific effectiveness and coping flexibility

Image: GoodStudio/Shutterstock.com

3A Stress

STUDY DESIGN DOT POINT

- internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Stress is a near-universal experience, occurring for us all to varying degrees each day. Categorising the different kinds of stimuli that cause us to feel stressed, as well as the different psychological and physiological processes that occur as a result of stress, can be extremely instructive. It can help us to understand why we experience these psychological and physiological states when we are stressed, and to recognise that these processes are common, even at times productive, helping us to overcome the stressful situation and return to a state of comfort.

In this lesson, you will learn to distinguish between internal and external stressors. Additionally, you will learn about the psychological and physiological components of the stress response. This includes the physiological process of the flight-or-fight-or-freeze response that occurs during acute stress and the role of the hormone cortisol during periods of chronic stress.

Stress 3.1.4.1

Stress is a psychological and physiological response to a stimulus, referred to as a stressor. There are internal and external stressors, both of which prompt us to experience stress.

Theory details

Stress is a psychological and physiological experience that occurs when an individual encounters something of significance that demands their attention and/or efforts to cope. A **stressor** is the term used to describe the stimulus (internal or external) that prompts the stress response.

Psychological components of stress include our personal assessments of what constitutes a stressful situation. These psychological processes are unique to each individual; we all conceptualise situations differently, so while a test at school may be considered stressful for some, others may process this same event differently. You will learn about the model that explains the psychological process of stress in more detail in lesson 3D Lazarus and Folkman's Transactional Model of Stress and Coping.

There are also physiological (biological, relating to the body) components of stress. These physiological components are mostly consistent between different people experiencing a stress response. For example, when watching horror movies, most people will experience an increase in heart rate at scary points. This increase in heart rate is a physiological response triggered by the nervous system, and is a fairly consistent response regardless of the person experiencing it.

KEY TERMS

Stress a psychological and physiological experience that occurs when an individual encounters something of significance that demands their attention and/or efforts to cope

Stressor a stimulus (internal or external) that prompts the stress response

Stress therefore includes both psychological processes that are unique to each individual and physiological processes that are mostly common to all.

USEFUL TIP

While the words 'psychological' and 'physiological' are similar and commonly confused, 'psychological' relates to mental processes, whereas 'physiological' relates to bodily processes. Furthermore, the words 'biological' and 'physiological' are synonymous, which means they have the same meaning and can be used interchangeably.

USEFUL TIP

It is important to understand the difference between the terms 'stress' and 'stressor', which closely resemble each other. Use the term 'stressor' when referring to the stimuli that elicit a psychological and/or physiological stress response. By contrast, use the term 'stress' when referring to someone's psychological and/or physiological response to the stressful situation.

Internal stressors 3.1.4.1.1

An **internal stressor** is a stimulus from within a person's body that prompts the stress response. Internal stressors include the way that we perceive different events that impact our lives, or biological symptoms, such as hunger or illness, that may prompt the stress response. Some internal stressors are cognitive and some are affective (relating to emotion). There are many different factors, psychological and biological, that can cause stress, or that influence us to perceive an event as being stressful. Internal stressors can include:

- Attitude – If someone has a negative attitude (i.e. they are pessimistic), this could make it more likely that they consider a situation to be outside of their capacity to cope, increasing the likelihood of experiencing stress.
- Rumination – Repeatedly thinking about the negative components of an event makes it more difficult to overcome, increasing the likelihood of experiencing stress.
- Low self-esteem – Someone having a negative opinion of themselves makes it more likely that they do not believe in their capacity to overcome a stressful situation, increasing the likelihood of experiencing stress.
- Nervous system dysfunction – The dysfunction of the production of certain neurotransmitters, such as gamma-amino butyric acid (GABA), could make it more likely to experience a stress response. GABA is the main inhibitory neurotransmitter in the human nervous system, so an insufficient neural transmission of GABA can lead to the over-excitation of neurotransmitters and make it difficult to regulate the stress response.

Internal stressors are therefore the cognitive and biological processes that cause stress or influence us to perceive stimuli in our environment as being stressful.

External stressors 3.1.4.1.2

An **external stressor** is a stimulus from outside of a person's body that prompts the stress response. External stressors come from our interaction with the world around us, not the cognitive or affective processes that impact how we perceive stressful events. For example, external stressors can include:

- a test or an exam
- meeting new people
- arguments with friends and/or family members
- working long hours
- financial difficulties.

External stressors are therefore the stimuli in our environment that demand our attention and effort to overcome. The distinctions between internal and external stressors are summarised in table 1.

Internal stressor

a stimulus from within a person's body that prompts the stress response

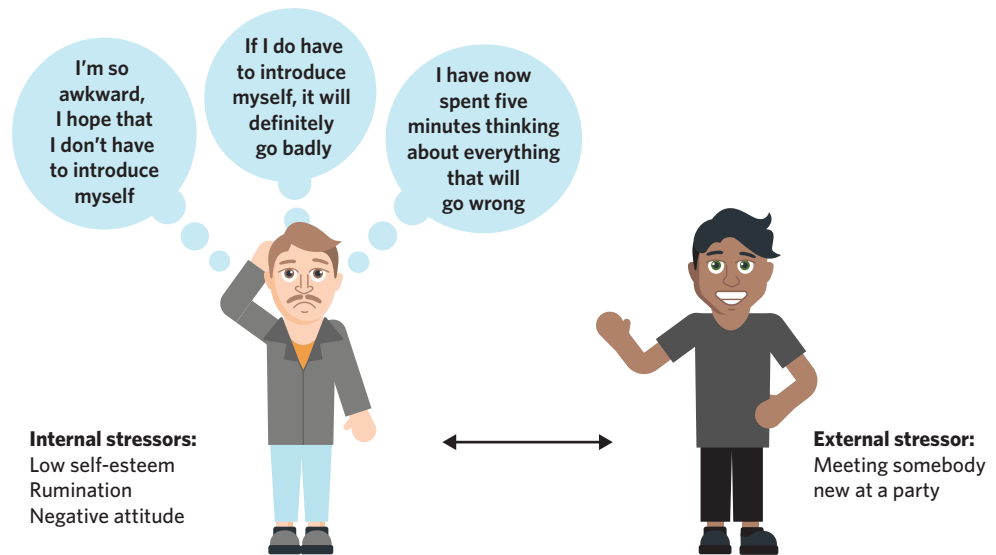
External stressor

a stimulus from outside of a person's body that prompts the stress response

Table 1 Comparison between internal and external stressors

| Internal stressors | External stressors |
|---|--|
| <ul style="list-style-type: none"> originate from within the individual psychological and biological processes examples include attitude, rumination, low self-esteem, and nervous system dysfunction. | <ul style="list-style-type: none"> originate from outside of the individual environmental stimuli examples include exams, meeting new people, arguments with others, work pressure, and financial difficulty. |

It is important to note that internal and external stressors do not always work in isolation. Instead, it is quite common for both internal and external stressors to contribute to somebody experiencing the stress response. This could occur, for example, by an external stressor, such as an upcoming exam, challenging our ability to cope and therefore prompting additional internal stressors, such as rumination (repeatedly worrying about the negative parts of a situation, like the consequences of failing). In other words, it is difficult to focus on the negative aspects of a situation (an internal stressor) without an event to worry about in the first place (an external stressor). The joint effect of internal and external stressors in causing somebody to experience stress is illustrated in figure 1, using the example of meeting somebody new at a party.

**Figure 1** Internal and external stressors combining to cause stress

Psychological stress responses 3.1.4.2

Stress also has psychological components. It is influenced by how we process a stressor and is accompanied by different emotional states, such as sadness or excitement.

Theory details

The psychological stress response relates to how we think or feel about a stressor and differs between different people. The same stressor can cause someone to experience a positive psychological state, such as excitement, while at the same time cause someone else to experience a negative psychological state, such as worry. Think about an upcoming test that you and your classmates have to sit for a particular subject. It is unlikely that everyone in the class will have the same psychological stress response; some may feel unprepared and therefore worried about what their mark will be, while others may feel more prepared and therefore excited to get it out of the way. Eustress and distress reflect the psychological nature of the stress response. These processes are detailed in table 2.

Table 2 A description and example of eustress and distress

| | Description | Example |
|-----------------|--|---|
| Distress | Distress is a form of stress characterised by a negative psychological state. Distress often occurs when a stressor presents an individual with an undesirable circumstance that appears to lead only to a negative outcome. | For example, when a person loses the keys to their car, they often experience distress. Losing car keys is likely to cause somebody to be late to their commitments, or even become a financial burden if the keys need to be replaced. As a result, emotions like worry and frustration occur as the individual contemplates the major inconveniences brought about by not finding their keys. |
| Eustress | Eustress is a form of stress characterised by a positive psychological state. Eustress involves positive emotions, such as feeling inspired and motivated, and tends to occur when the stressor provides a positive opportunity or circumstance for the individual. | For example, being offered a place at university can be stressful in that it demands change and effort, but it often results in positive emotions, such as feeling motivated and excited for personal growth. |

Distress a form of stress characterised by a negative psychological state
Eustress a form of stress characterised by a positive psychological state

Eustress and distress as psychological stress responses are significant in that they demonstrate that stress is highly subjective; what may elicit eustress for one individual may elicit distress for another. Furthermore, eustress and distress are not static states, meaning that they are open to change and constant reinterpretation by the individual. For example, what may begin as eustress could later change to distress if the demands of the stressor change.

USEFUL TIP

The psychological components of the stress response, including eustress and distress, demonstrate the subjective nature of stress. This means that psychological stress responses will be experienced differently by different people, depending on their individual perception of the stressor. By contrast, physiological stress responses are often referred to as being objective. This means that similar physiological stress responses are more common across different people.

As a general rule, high levels of eustress prompt an increase in performance and functioning. Distress also prompts high performance, however if it becomes so overwhelming that an individual cannot cope, performance may decrease. Ultimately, this demonstrates the utility of stress in some circumstances, as certain levels of physiological and psychological stress can prompt a rise in productivity. A summary of the differences between eustress and distress is provided in figure 2.

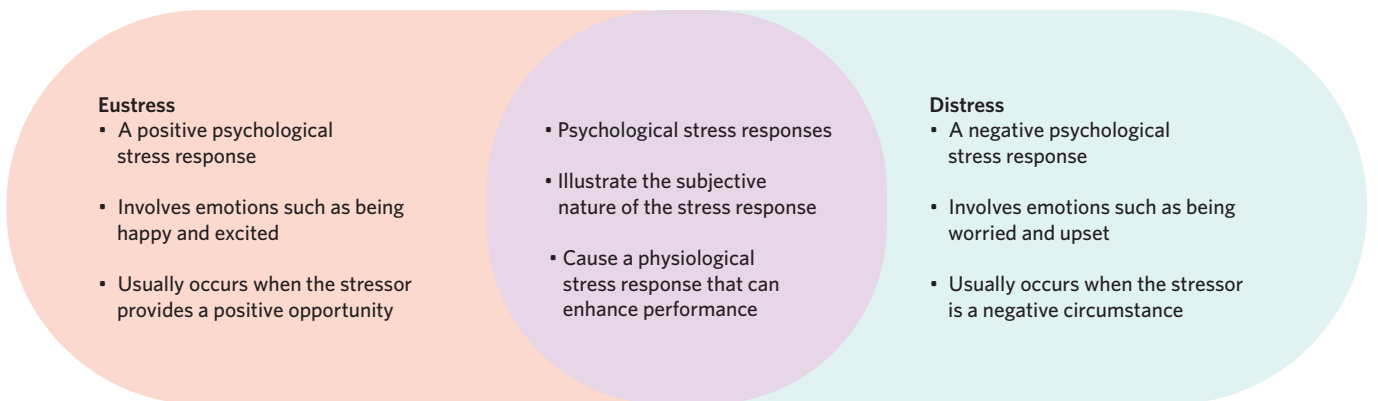


Figure 2 Eustress and distress venn diagram

Physiological stress responses 3.1.4.3

As mentioned, there are also physiological components of stress, which are experienced by different people in similar ways. We will examine two biological stress responses in this lesson: the flight-or-fight-or-freeze response to acute stress and the release of cortisol during chronic stress.

Theory details

The physiological stress response relates to how the body reacts to a stressor. The physiological components of stress are usually experienced in similar ways between different people and in response to different stressors. However, different biological stress responses will occur depending on the length of time that the stressor demands somebody’s attention and/or efforts to cope.

Acute stress a form of stress characterised by intense psychological and physiological symptoms that are brief in duration

The flight-or-fight-or-freeze response an involuntary and automatic response to a threat that takes the form of either escaping it, confronting it, or freezing in the face of it

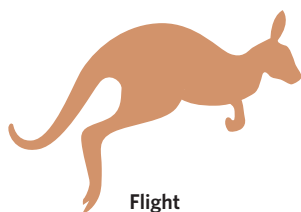
The flight-or-fight-or-freeze response in acute stress 3.1.4.3.1

Acute stress is a form of stress characterised by intense psychological and physiological symptoms that are brief in duration. This form of stress presents an immediate threat to an organism’s safety. In order to survive, an organism (a living thing) must quickly respond and activate their physiological responses. It is under this kind of circumstance that **the flight-or-fight-or-freeze response** is activated, which is an involuntary and automatic response to a threat that takes the form of either escaping it, confronting it, or freezing in the face of it. Generally speaking, the flight-or-fight-or-freeze response is adaptive in some way for an organism, helping it to survive in the face of a stressor. The flight-or-fight-or-freeze response is therefore a common response during acute stress for lots of different organisms, including humans.

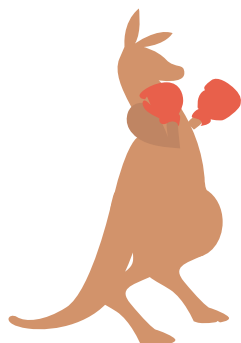
Imagine a kangaroo, for example, that is confronted by the high-beam headlights of a car that just started. The kangaroo could either confront its stressor and attack the car (fight), hop away to evade its stressor (flight), or become completely stunned and remain frozen in time for a few moments (freeze). This example is illustrated in figure 3.

Each of the fight, flight, and freeze responses have different effects on our nervous system functioning. These different physiological components of the flight-or-fight-or-freeze response are detailed in table 3.

Table 3 The physiological characteristics of each of the flight, fight, and freeze components of the flight-or-fight-or-freeze response



Flight



Fight



Freeze

Figure 3 In the face of a threat, the flight-or-fight-or-freeze response occurs

| | Physiological characteristics |
|---------------|---|
| Flight | <ul style="list-style-type: none"> • In the ‘flight’ response, an organism flees from the stressor. • This is generally because escaping the situation is perceived by the organism to be the safest option. • This response also depends on an activation of the sympathetic nervous system, which prompts the release of adrenaline from the adrenal glands and allows the body to quickly flee from the threat. |
| Fight | <ul style="list-style-type: none"> • In the ‘fight’ response, an organism confronts their stressor. • This reaction is characterised by the activation of sympathetic responses that energise the body and make it better able to deal with danger. This is done, for example, through the sympathetic nervous system prompting adrenaline to be released from the adrenal glands. |
| Freeze | <ul style="list-style-type: none"> • The ‘freeze’ response is characterised by the body’s immobility and shock in response to a stressor. • This is generally because the stressor seems so threatening that the body cannot respond right away, being physically ‘frozen’ as it orients itself and processes the stressor. • It can also occur when the body perceives that it lacks adequate energy or time to fight against, or flee from the stressor. • Further, remaining very still can sometimes be the greatest guarantee of safety for an organism. For example, animals that encounter predators may remain very still in order to remain unseen. • In terms of nervous system responses, the freeze response involves a brief activation of the parasympathetic nervous system as some bodily reactions, such as blood pressure, drop below normal levels. • However, it can also involve an almost simultaneous activation of the sympathetic nervous system, with the freeze response often only lasting seconds. |

LESSON LINK

Each of the responses in the flight-or-fight-or-freeze response involve physiological responses of the autonomic nervous system that you learnt about in lesson **2B Conscious and unconscious responses**. You can look at this lesson to understand some of the specific biological reactions that may occur in this response.

Some of the physiological reactions activated by the flight-or-fight-or-freeze response include:

- increased heart rate and blood flow (fight-flight)
- increased breathing rate (fight-flight)
- drop in blood pressure (freeze).

The role of cortisol in chronic stress 3.1.4.3.2

Chronic stress is a form of stress that endures for several months or longer. For example, this could include a school year, which can often cause lasting stress throughout the year as students try to balance studying for tests/exams with social activities, work, and interests outside of school. This kind of stress does not demand an immediate response, like the flight-or-fight-or-freeze response, but rather a long-term biological response that will energise the body over a period of weeks or months.

Cortisol is a hormone that is released in times of stress to aid the body in initiating and maintaining heightened arousal. It is released by the adrenal glands, and is involved in both short-term and longer-term responses to stress. During the flight-or-fight-or-freeze response, cortisol helps to energise the body by inducing the release of glucose and a rise in blood-sugar levels. However, unlike adrenaline and noradrenaline, cortisol also helps the body to remain at above-average levels of arousal even after this initial flight-or-fight-or-freeze response is over. Due to cortisol being stimulated by a different pathway when compared to adrenaline and noradrenaline, cortisol is released over a more prolonged period and therefore takes longer to be secreted into the body. This allows the body to continue to deal with stress for longer, rather than simply face an imminent threat.

During the stress response, cortisol serves the adaptive functions of:

- increasing blood sugar levels
- improving metabolism
- energising the body
- reducing inflammation.

However, when stress is long-term and high cortisol levels remain in the bloodstream, cortisol can suppress the immune system. This is because it causes the body's functions to operate at heightened levels, depleting the energy required to fight off bacteria. The body cannot maintain high levels of cortisol forever, and eventually its stores will deplete. You will learn more about the role of cortisol during periods of chronic stress in lesson 3C Selye's General Adaptation Syndrome.

The amount of time that a stressor demands our attention and resources to cope, then, determines the kind of biological response that will be experienced. A summary of the differences between the symptoms of acute and chronic stress is provided in table 4.

Table 4 A comparison of the biological symptoms of acute and chronic stress

| Responses to acute stress | Responses to chronic stress |
|---|--|
| <ul style="list-style-type: none"> • Cortisol helps to energise the body by inducing the release of glucose and a rise in blood-sugar levels • Confronts the threat (fight) • Fleeing from the source of danger (flight) • Immobility and shock (freeze). | <ul style="list-style-type: none"> • Enduring release of cortisol • Increasing blood sugar levels • Improving metabolism • Energising the body • Reducing inflammation • Immuno-suppression. |

Chronic stress a form of stress that endures for several months or longer

Cortisol a hormone that is released in times of stress to aid the body in initiating and maintaining heightened arousal

Theory summary

As you learnt in this lesson, stress involves both psychological and physiological responses to stressors. Psychological stress responses include the different affective states of eustress and distress. These positive and negative psychological states that occur in response to a stressor demonstrate the subjective nature of the stress response. Physiological stress responses are instead more consistent across different people. The flight-or-fight-or-freeze response is one such physiological stress response that occurs during periods of acute stress, and the prolonged release of cortisol is another that occurs during periods of chronic stress. The main concepts of this lesson are summarised in figure 4.

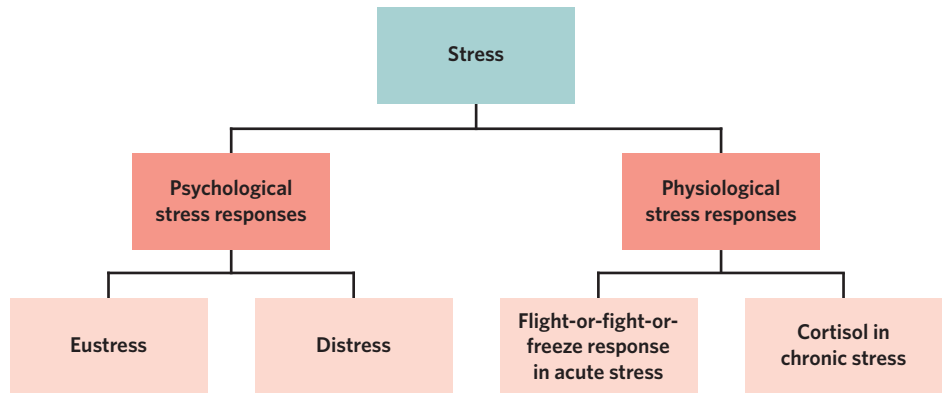


Figure 4 Summary diagram of lesson 3A

3A Questions

Theory review

Question 1

Stress is a

- A. psychological process.
- B. biological process.
- C. psychological and biological process.

Question 2

The psychological component of stress is experienced in _____ for different people.

Which of the following best fills in the blank?

- A. different ways
- B. the same way

Question 3

The same stressor can cause one person to experience eustress (a form of stress characterised by a positive psychological state) and another person distress (a form of stress characterised by a negative psychological state). What does this demonstrate about stress? **(Select all that apply)**

- I. Stress can be subjective.
- II. Stress can involve physiological responses, such as experiencing sadness.
- III. Stress can involve psychological responses, such as experiencing different emotions.
- IV. Stress is always the same experience for everyone.

Question 4

The flight-or-flight-or-freeze response is a biological response to chronic stress.

- A. True.
- B. False.

Question 5

Cortisol is a hormone that is released during periods of

- A. acute stress.
- B. chronic stress.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 6

Stress is both a psychological and physiological process.

Which of the following is a characteristic of psychological stress responses in comparison to physiological stress responses?

- A. Psychological stress responses are objective, whereas physiological stress responses are subjective.
- B. Different people usually experience the same psychological stress responses to the same stressor, whereas physiological stress responses are always different.
- C. An example of a psychological stress response is the fight-or-flight-or-freeze response, whereas an example of a physiological stress response is distress.
- D. Different people can experience different psychological stress responses to the same stressor, whereas similar physiological stress responses are more common across different people.

Question 7

The flight-or-flight-or-freeze response and the prolonged release of the hormone cortisol are both examples of physiological stress responses.

How is the flight-or-flight-or-freeze response different from the release of cortisol?

- A. The flight-or-flight-or-freeze response is a temporary response to acute stress, whereas the release of cortisol endures during periods of chronic stress.
- B. The release of cortisol is a temporary response to acute stress, whereas the flight-or-flight-or-freeze response endures during periods of chronic stress.
- C. The flight-or-flight-or-freeze response is an example of an external stressor, whereas the release of cortisol is an example of an internal stressor.
- D. The flight-or-flight-or-freeze response is an example of an internal stressor, whereas the release of cortisol is an example of an external stressor.

Perfect your phrasing

Question 8

Which of the following sentences is most correct?

- A. Stressors are **stimuli** that demand our attention and coping resources to overcome.
- B. Stressors are **responses** to stressful situations.

Question 9

Which of the following sentences is most correct?

- A. An internal stressor is a stimulus originating from **within a person's body** that prompts the stress response.
- B. An internal stressor is a stimulus originating from **within the environment** that prompts the stress response.

Exam-style**Remember and understand****Question 10** (1 MARK)

The flight-fight-freeze response can be considered

- A. a short-term psychological response to stress.
- B. a long-term psychological response to stress.
- C. a short-term biological response to stress.
- D. a long-term biological response to stress.

Question 11 (1 MARK)

During prolonged stress, cortisol

- A. keeps the body at optimal functioning.
- B. can cause immunosuppression.
- C. triggers the freeze response.
- D. helps to reduce stress.

Adapted from VCAA Psychology exam 2018 Q4

Question 12 (4 MARKS)

With the use of examples, compare internal and external stressors.

Apply and analyse

Use the following information to answer questions 13 and 14.

Willow is at an auction for a house she is trying to buy. She has fallen in love with the property, and really wants to beat the other buyers. Willow feels stunned before the auction begins. She can even feel her body stiffen up and worries that she won't be able to bid at all. During the auction, Willow nonetheless starts bidding, although she can feel her heart beating loudly and feels as though her body is rushing with energy.

Question 13 (1 MARK)

The role of cortisol for Willow during the bidding is to

- A. mobilise her body to confront a stressor.
- B. mobilise her body to stay calm in the face of a stressor.
- C. weaken her immune system.
- D. activate her freeze response.

Question 14 (1 MARK)

In terms of the flight-or-fight-or-freeze response, what is Willow experiencing before the auction begins?

- A. The flight response.
- B. The fight response.
- C. The freeze response.
- D. Immuno-suppression.

Question 15 (6 MARKS)

Dillon and Cora are preparing a song for their school talent show. During their final rehearsal, Dillon feels motivated, telling Cora that he is excited to perform in front of the school, whereas Cora says that she is extremely worried about it. When it comes to the performance, Dillon, although nervous, feels energised and starts to sing his part. Cora, however, is stunned by the audience, stands still, and cannot sing.

- a. Compare the psychological stress responses that Dillon and Cora experience during their final rehearsal for the talent show. (2 MARKS)
- b. In terms of the flight-or-fight-or-freeze response, explain the types of responses that Dillon and Cora experienced at the beginning of the song. (4 MARKS)

Questions from multiple lessons**Question 16** (1 MARK)

The freeze response can cause an organism's blood pressure to drop below normal levels. Which division of the nervous system is likely to be dominant when this occurs?

- A. The sympathetic division of the central nervous system.
- B. The parasympathetic division of the central nervous system.
- C. The sympathetic division of the autonomic nervous system.
- D. The parasympathetic division of the autonomic nervous system.

Question 17 (3 MARKS)

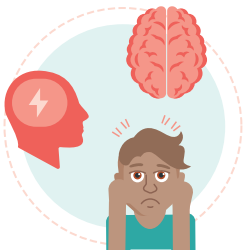
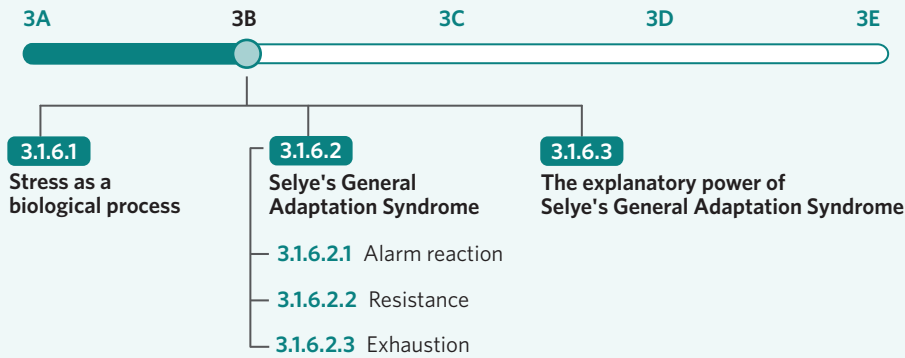
Zeneb is at the state finals for her age group in long jump. She is feeling very excited and is about to run, and notices her heart beating quickly in her chest. When it comes time to race, Zeneb beats her personal record and wins the state final, which means that she qualifies for a national championship in a few months. Zeneb feels incredibly nervous in the months leading up to the national championship, even developing a cold a few weeks before it is set to take place.

- a. Describe the role of cortisol in the lead up to Zeneb participating in the national championship. (2 MARKS)
- b. Identify the division of the nervous system responsible for Zeneb's heart beating quickly. (1 MARK)

3B Selye's General Adaptation Syndrome

STUDY DESIGN DOT POINT

- the explanatory power of Hans Selye's General Adaptation Syndrome as a biological model of stress, including alarm reaction (shock/counter shock), resistance and exhaustion



Reflect on a time when you experienced stress. You may have experienced physiological changes as your body reacted to the stress. For example, you may have felt muscle tension and your heart pounding. You may have even suffered from a headache or sickness if the stress was experienced for a prolonged period of time.

This chapter considers stress as a psychobiological process. In this lesson, you will be focusing on the biological aspects of stress. You will learn about Selye's General Adaptation Syndrome, which is a biological model that explains the stress response from a physiological perspective.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Stress as a biological process 3.1.6.1

When you experience stress, physiological reactions occur as your body responds to the stressor. Therefore, stress is a biological process just as much as it is a psychological process.

Theory details

Stress is a psychobiological process, meaning the stress response involves both psychological and biological aspects. In order to develop an understanding of stress as a psychobiological process, it is important to understand how biological processes contribute to the stress response. Biological processes relate to physiological experiences that occur in the body, such as immune system functioning and the release of hormones.

This lesson examines stress from a biological perspective. It focuses on Selye's General Adaptation Syndrome (GAS), which is a biological model of stress that explains the various physiological reactions that occur in the presence of stressors.

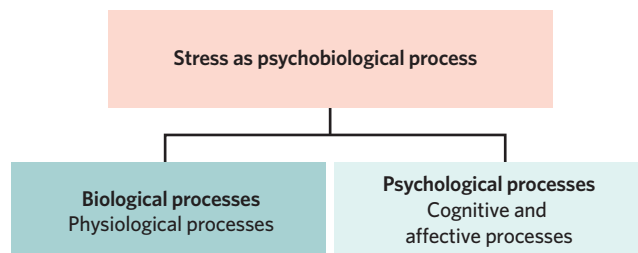


Figure 1 This lesson focuses on the psychobiological process of stress from a biological perspective

Selye's General Adaptation Syndrome 3.1.6.2

According to Hans Selye, every time you are confronted with a stressor, you progress through the stages and substages of the General Adaptation Syndrome.

Theory details

Selye's **General Adaptation Syndrome (GAS)** is a biological model involving three stages of physiological reactions that a person experiences in response to a persistent stressor. It explains the experience of stress from a biological perspective.

Hans Selye identified a predictable pattern of physiological responses that an individual endures when experiencing stress. He developed the GAS, which is a model of stress that reflects this biological pattern through three stages: alarm reaction, resistance, and exhaustion. Selye proposed that a person progresses through these stages in the presence of a stressor.

Selye's General Adaptation Syndrome is presented in figure 2. This diagram displays the three stages of this biological model of stress; alarm reaction, resistance, and exhaustion. It also displays the two substages of the alarm reaction stage: shock and counter shock. In this lesson, these stages and substages of the GAS will be explored in detail.

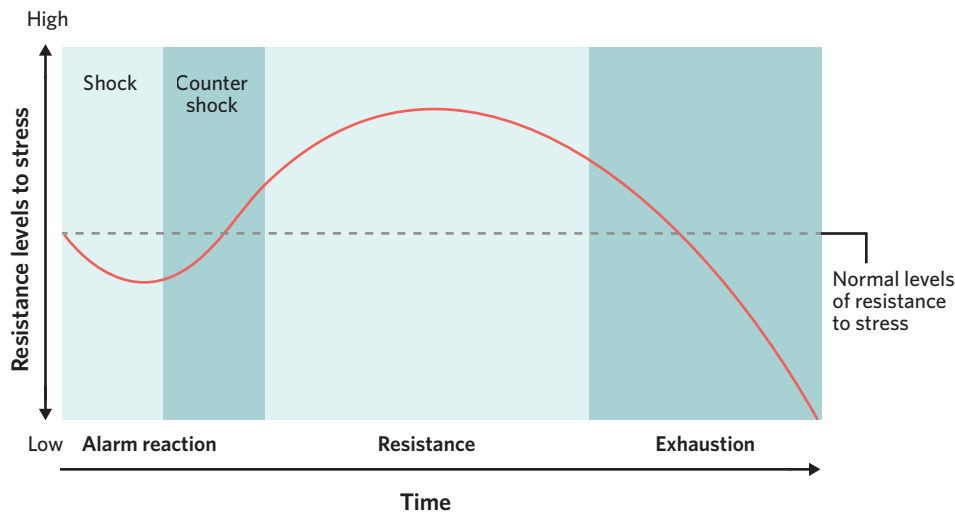


Figure 2 Selye's General Adaptation Syndrome

USEFUL TIP

When answering exam questions about Selye's General Adaptation Syndrome, it is important to write the full term 'General Adaptation Syndrome' and the acronym enclosed in brackets '(GAS)' the first time you mention it. Only after doing this may you use the acronym 'GAS' in your answer.

KEY TERMS

General Adaption Syndrome (GAS)

a biological model involving three stages of physiological reactions that a person experiences in response to a persistent stressor

USEFUL TIP

The acronym 'SCARE' is a memory device that may help you remember the stages and substages of Selye's General Adaptation Syndrome

- Shock
- Counter shock
- Alarm reaction
- Resistance
- Exhaustion

Alarm reaction 3.1.6.2.1

The first stage of Selye's General Adaptation Syndrome (GAS) is **alarm reaction**, which involves the initial decrease and subsequent increase in bodily arousal in response to an immediate stressor. This stage occurs when an individual first encounters and becomes aware of a stressor. The alarm reaction stage is divided into two substages: shock and counter shock.

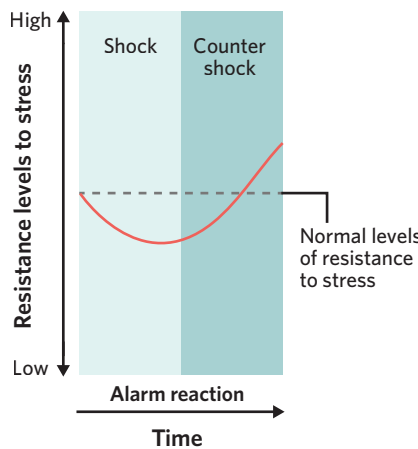


Figure 3 The alarm reaction stage of Selye's General Adaptation Syndrome, including the shock and counter shock substages

Alarm reaction the first stage of the General Adaptation Syndrome involving the initial decrease and subsequent increase in bodily arousal in response to an immediate stressor

Shock the first substage of the alarm reaction stage involving decreased bodily arousal for a brief period of time following the initial exposure to a stressor

Counter shock the second substage of the alarm reaction stage in which sympathetic nervous system responses occur that mobilise the body to respond to the stressor

USEFUL TIP

When answering an exam question about Selye's General Adaptation Syndrome, if you identify that someone is in the shock or counter shock substages, it is important to also identify that these substages are part of the alarm reaction stage to be awarded full marks. Conversely, if you identify that someone is in the alarm reaction stage, it is also important to identify the substage (shock or counter shock) that they are experiencing where relevant.

Resistance the second stage of the General Adaptation Syndrome involving maintaining high levels of bodily arousal in response to a persistent stressor

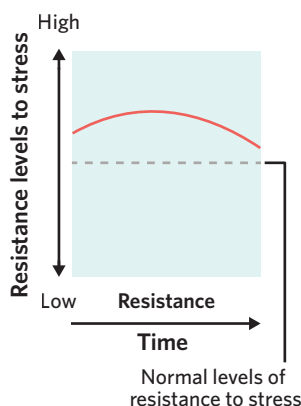


Figure 4 The resistance stage of Selye's General Adaptation Syndrome

Table 1 The substages of the alarm reaction stage

| Substage | Explanation |
|----------------------|---|
| Shock | <p>Shock is the first substage of the alarm reaction stage involving decreased bodily arousal for a brief period of time following the initial exposure to a stressor. During this substage, the body experiences a temporary state of shock. It reacts as though it has been injured, as biological processes within the body fall below normal functioning. For example, body temperature, blood pressure, and muscle tone momentarily decrease.</p> <p>When a person enters shock, their levels of bodily arousal, and therefore their ability to deal with the stressor, are reduced to below normal. This lasts only for a relatively brief period of time before the person enters the second substage of the GAS.</p> <p>Reflect on a time when you experienced stress. You may have felt immobilised and panicked when initially confronted with the stressor. This immediate reaction was your experience of shock.</p> |
| Counter shock | <p>Counter shock is the second substage of the alarm reaction stage in which sympathetic nervous system responses occur that mobilise the body to respond to the stressor. During this substage, the activation of the sympathetic nervous system causes physiological reactions to occur. For example, heart rate increases and stress hormones, including adrenaline and cortisol, are released into the bloodstream. This energises the body to confront and respond to the stressor.</p> <p>When a person enters counter shock, their levels of bodily arousal, and therefore their ability to deal with the stressor, increase to above normal. This marks the beginning of the increase in levels of resistance to stress that continues into the second stage of the GAS.</p> |

LESSON LINK

In lesson **3A Stress**, you learnt about physiological responses to stress, including the flight-or-fight-or-freeze response in acute stress and the release of cortisol. These physiological responses to stress are involved in Selye's General Adaptation Syndrome.

For example, during counter shock, the sympathetic nervous system is activated, which is the same division of the nervous system that is dominant during the flight-or-fight-or-freeze response. Therefore, similar physiological reactions occur during counter shock as during the flight-or-fight-or-freeze response.

Resistance 3.1.6.2.2

The second stage of Selye's General Adaptation Syndrome (GAS) is **resistance**, which involves maintaining high levels of bodily arousal in response to a persistent stressor.

During this stage, levels of bodily arousal, and therefore the ability to deal with the stressor, remain above normal. Increased cortisol levels contribute to the maintenance of this heightened physiological state, enabling the body to continue to respond to the stressor.

Resistance is an adaptive stage because the body adjusts to the physiological changes that occurred during counter shock, including increased hormone levels and increased bodily arousal. These sympathetic nervous system responses decrease in intensity as the body attempts to stabilise its internal environment.

When a person enters resistance, the majority of their energy is directed towards confronting the stressor. Therefore, while resistance to the initial stressor increases, resistance to subsequent stressors that may arise decreases. Furthermore, the prolonged presence of stress hormones in the bloodstream, particularly cortisol, begins to suppress immune system functioning, which increases susceptibility to illness. However, the individual is still able to cope with the demands of the initial stressor.

During resistance, bodily resources are used at an increased rate to maintain the state of heightened arousal. These resources are eventually depleted, causing the individual to progress from resistance to the third and final stage of the GAS.

Exhaustion 3.1.6.2.3

The third stage of Selye's General Adaptation Syndrome (GAS) is **exhaustion**, which involves the depletion of energy levels and bodily resources, resulting in an inability to cope with the stressor.

By the time a person has entered exhaustion, exposure to the stressor has been prolonged and persistent. The body has been required to maintain a heightened physiological state for as long as the stressor has been present, which is now an extended period of time. During exhaustion, the body becomes unable to maintain these heightened levels of physiological arousal because bodily resources, such as energy and stress hormones, have been depleted. Therefore, levels of bodily arousal and the ability to deal with the stressor decrease to below normal. The person experiencing exhaustion can no longer cope with the demands of the stressor and is also unequipped to confront any other stressors that may arise.

Furthermore, when a person enters exhaustion, cortisol and other stress hormones have been present in the bloodstream for a prolonged period of time, suppressing immune system functioning. Therefore, a person in exhaustion becomes vulnerable to both physiological and psychological illnesses. They may experience extreme fatigue, high blood pressure, sickness, anxiety, depression, or emotional instability. They are also more susceptible to serious chronic conditions, such as cardiovascular disease.

WANT TO KNOW MORE?

Often referred to as the 'father of stress research', Hans Selye was the first scientist to identify the relationship between stress and disease (Tan & Yip, 2018). Prior to his research, particularly the GAS, it had not been recognised that the experience of stress impacts physiological processes and contributes to the development of disease.

USEFUL TIP

The difference between resistance and exhaustion is commonly confused by students. When given a scenario that describes a person progressing through Selye's General Adaptation Syndrome (GAS), it can sometimes be difficult to identify which of these stages a person is experiencing. The distinction between resistance and exhaustion is demonstrated by questions 1b and 1c of the VCAA Psychology exam 2021.

In question 1b, students were presented with the following scenario: 'Bob works for a highly competitive and demanding advertising company with a stressful work environment... After many months, Bob started experiencing headaches and frequently caught colds.' Students were then asked to identify the stage of the GAS that Bob was in when he started frequently catching colds and justify their response.

According to the examiners' report, students needed to identify that Bob was in the resistance stage of the GAS. While the ongoing release of cortisol and subsequent suppression of the immune system during the resistance stage has caused Bob to suffer from a cold, this is not a severe illness and Bob is still continuing to function. In other words, the experience of mild illness does not necessarily mean that a person is in exhaustion.

In question 1c, students were presented with further information: 'After working in this highly stressful environment for many years, Bob was diagnosed with a heart condition that required surgery.' Students were then asked to identify the stage of the GAS that Bob was in when he was diagnosed with a heart condition and justify their response.

According to the examiners' report, students needed to identify that Bob was in the exhaustion stage of the GAS. This is because Bob being diagnosed with a heart condition is a severe illness that resulted from Bob's systems operating at an elevated rate and the subsequent depletion of his physiological resources.

Exhaustion the third stage of the General Adaptation Syndrome involving the depletion of energy levels and bodily resources, resulting in an inability to cope with the stressor

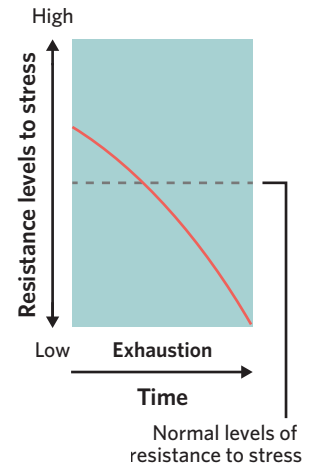


Figure 5 The exhaustion stage of Selye's General Adaptation Syndrome

You have now learnt about the stages and substages of the GAS. Table 2 provides an example of someone progressing through these stages and substages in response to a stressor. This may help consolidate your understanding of this biological model of stress.

Table 2 An example of someone progressing through the stages and substages of Selye's General Adaptation Syndrome

| Stressor: Sophie was driving and accidentally crashed into another car as she attempted to merge into traffic. The damage to both vehicles was quite extensive. | | |
|--|----------------------|---|
| Stage | Substage | Explanation |
| Alarm reaction | Shock | Immediately after the car crash, Sophie freezes behind the steering wheel and feels unable to move. She struggles to comprehend what has just happened, and is momentarily unable to think or act. |
| | Counter shock | Following this temporary state of shock, Sophie experiences intense sympathetic nervous system responses, including her heart pounding in her chest. She is alert and energised as she feels a rush of adrenaline. She is able to exit the car, check that the other driver is unharmed, and exchange personal details with them. |
| Resistance | | Sophie returns home and makes an insurance claim. She is informed that she must pay \$3000 to the insurance company to repair both cars. Sophie is only a casual worker because she is studying at university, and this is therefore very expensive for her. Over the next month, Sophie picks up extra shifts to pay for the claim fee. At some point during the month, she begins to develop regular headaches, but still has the energy to work towards paying off the claim fee. |
| Exhaustion | | After one month, Sophie still does not have enough money to pay the claim fee. Furthermore, the person who she crashed into has started to send Sophie angry text messages demanding that she pay the claim fee so that the cars can be repaired. Sophie feels extremely tense and anxious, believing that she will never have the money to pay the claim fee. She has stopped going to work because she has no energy and feels incredibly fatigued. Furthermore, her body is so run down that she is constantly sick and struggles to get out of bed every morning. |

USEFUL TIP

It is important to understand that a person does not necessarily progress through the entire GAS. If the stressor is no longer present, the person stops progressing through the stages and substages.

The explanatory power of Selye's General Adaptation Syndrome 3.1.6.3

Selye's General Adaptation Syndrome is a powerful model for explaining the stress response from a biological perspective. However, as with any scientific model, it does not always accurately reflect the full complexity of the experience of stress.

Theory details

Selye's General Adaptation Syndrome (GAS) successfully explains the stress response in terms of physiological reactions that occur in the presence of stressors. Therefore, it serves as a useful model for explaining the biological processes involved in the stress response. However, as with any scientific model, this model of stress is not a perfect explanation of the stress response. It has limitations in its ability to completely capture the complexity of the phenomenon it attempts to explain.

Familiarising yourself with the strengths and limitations of the GAS, which are outlined in table 3, will help you understand and evaluate the explanatory power of this biological model of stress.

Table 3 Strengths and limitations of the GAS

| Strengths | Limitations |
|--|--|
| <ul style="list-style-type: none"> The GAS recognises a predictable pattern of physiological responses associated with distinct stages and substages, which can be measured in individuals. The GAS recognises the relationship between chronic stress and illness. The GAS provides objective, empirical information about the biological processes involved in the stress response. | <ul style="list-style-type: none"> The GAS is based on research that was conducted on rats, reducing the generalisability of the model to the human population. The GAS only focuses on the biological aspects of stress. It ignores the importance of psychological factors, including emotion and cognition, in the stress response. The GAS prescribes a uniform model that is the same for every individual in response to all stressors. Therefore, it fails to recognise the subjective nature of the stress response, meaning that different people respond to different stressors in unique ways. |

Theory summary

In this lesson, you have learnt about Selye's General Adaptation Syndrome, including its three stages (alarm reaction, resistance, exhaustion) and two substages (shock, counter shock). You have also learnt about the explanatory power of this biological model of stress, including some of its strengths and limitations.

3B Questions

Theory review

Question 1

Selye's General Adaptation Syndrome explains the stress response from a _____ perspective.

Which of the following best fills in the blank?

- A. physiological
- B. psychological

Question 2

Selye's General Adaptation Syndrome involves _____ stages and _____ substages.

Which of the following best fills in the blanks?

- A. two; three
- B. three; two

Question 3

Which of the following can be used to describe each stage or substage of Selye's General Adaptation Syndrome? **(Select all that apply)**

- I. Levels of resistance to stress.
- II. The ability to cope with the demands of the stressor.
- III. Levels of bodily arousal.

Question 4

Counter shock occurs before shock, and both substages are part of the alarm reaction stage.

- A. True.
- B. False.

Question 5

During which of the following stages is the individual able to cope with the demands of the initial stressor, despite the prolonged presence of cortisol in the bloodstream beginning to suppress immune system functioning?

- A. Alarm reaction.
- B. Resistance.
- C. Exhaustion.

Question 6

A person only reaches the exhaustion stage of Selye's General Adaptation Syndrome if exposure to the stressor is prolonged and persistent.

- A. True.
- B. False.

Question 7

Selye's General Adaptation Syndrome always accurately explains the experience of stress.

- A. True.
- B. False.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

Which of the following is a similarity between the flight-or-fight-or-freeze response and Selye's General Adaptation Syndrome?

- A. Both the flight-or-fight-or-freeze response and Selye's General Adaptation Syndrome focus on the stress response from a biological perspective.
- B. Both the flight-or-fight-or-freeze response and Selye's General Adaptation Syndrome focus on the stress response from a psychological perspective.
- C. Both the flight-or-fight-or-freeze response and Selye's General Adaptation Syndrome focus on the long-term stress response that occurs in the presence of a prolonged and persistent stressor.

Question 9

Both the flight-or-fight-or-freeze response and Selye's General Adaptation Syndrome involve

- A. the prolonged release of stress hormones, particularly cortisol, into the bloodstream.
- B. stages that an individual progresses through in response to a stressor.
- C. sympathetic nervous system responses, including increased heart rate.

Question 10

The flight-or-fight-or-freeze response occurs during _____ stress, whereas Selye's General Adaptation Syndrome occurs during _____ stress.

Which of the following best fills in the blanks?

- A. chronic; acute
- B. acute; chronic

Data analysis

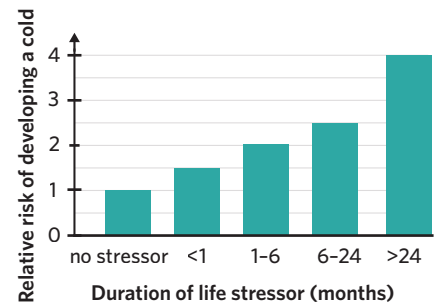
The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 11–14.

Cohen et al. (1998) conducted a research study which investigated the association between the duration of time spent experiencing a life stressor and the relative risk of developing a cold. The sample was 276 volunteers who responded to an advertisement published in a newspaper. Participants completed an interview to determine their experience of life stressors. Participants were also administered nasal drops containing a mild dose of viral infection and monitored for the development of a cold.

The graph presents the findings of this research study.



Question 11

Which sampling method was used in this research study?

- Random sampling.
- Stratified sampling.
- Convenience sampling.

Question 12

Which of the following best describes the results of this research study?

- As the duration of the life stressor increases, the relative risk of developing a cold increases.
- As the duration of the life stressor increases, the relative risk of developing a cold decreases.

Question 13

A possible explanation for the results of this research study is that the longer the life stressor persists, the longer that _____ present in the bloodstream, suppressing immune system functioning.

Which of the following best fills in the blank?

- adrenaline
- cortisol
- dopamine

Question 14

Some participants had been experiencing a life stressor for more than 24 months. What stage of Selye's General Adaptation Syndrome are they most likely in?

- Alarm reaction.
- Resistance.
- Exhaustion.

Exam-style

Remember and understand

Question 15 (1 MARK)

Selye's General Adaptation Syndrome is an example of

- a long-term psychological response to stress.
- a short-term psychological response to stress.
- a long-term physiological response to stress.
- a short-term physiological response to stress.

Adapted from VCAA Psychology exam 2 2012 Q29

Question 16 (1 MARK)

Which of the following options best matches a stage of Selye's General Adaptation Syndrome and the role of cortisol in this stage?

| | Stage | Role of cortisol |
|----|----------------|--|
| A. | Alarm reaction | The release of cortisol mobilises the body and increases psychological arousal to respond to the stressor. |
| B. | Resistance | Sustained levels of cortisol in the bloodstream decrease levels of psychological arousal. |
| C. | Exhaustion | Depleted levels of cortisol increase the ability of the body to respond to the stressor. |
| D. | Resistance | Sustained levels of cortisol in the bloodstream maintain increased levels of physiological arousal. |

Adapted from VCAA Psychology exam 1 2017 Q1

Question 17 (2 MARKS)

Compare the resistance stage and the exhaustion stage of Selye's General Adaptation Syndrome.

Question 18 (2 MARKS)

Outline one strength and one limitation of Selye's General Adaptation Syndrome.

Apply and analyse**Question 19** (1 MARK)

Winnie has been under significant pressure in recent months. Her parents have told her that they expect her to study hard and achieve high scores in her exams. Furthermore, her parents have asked her to work several days a week for the family business. Winnie has felt as though her entire life is either studying or working for some time now. She has begun to experience recurring viral infections during this time, which her doctor attributes to stress.

Winnie's recurring viral infections are most likely due to

- A. an increase in adrenaline.
- B. an increase in cortisol.
- C. a decrease in cortisol.
- D. a decrease in serotonin.

Adapted from VCAA Psychology exam 2014 Q33

Question 20 (2 MARKS)

Robert has recently been diagnosed with type 2 diabetes. Robert was initially shocked and uncertain of how to respond when he discovered this diagnosis. However, several weeks have passed, and Robert is determined to manage himself as best he can. He has done research on type 2 diabetes and has spoken to his doctor on how to best manage his condition. He has developed several colds recently but continues to manage his diagnosis.

Identify the stage of Selye's General Adaptation Syndrome that Robert is likely experiencing. Justify your response.

Question 21 (4 MARKS)

Freya and Silas are performing together at their school talent show. Their song begins to play as they step onto the stage and stand before the audience. Although she felt panicked backstage several moments earlier, Freya now feels energised and sings her part confidently. However, Silas is frozen in front of the audience and forgets the opening lines of the song.

Identify the likely stage and substage of Selye's General Adaptation Syndrome that Freya and Silas were experiencing when the song begins to play. Justify your response.

Question 22 (5 MARKS)

Professor Shelby conducted a research study to investigate the relationship between sex and the time taken to reach the exhaustion stage of Selye's General Adaptation Syndrome. Professor Shelby obtained a sample of 20 males and 20 females. Participants must have had a family member who had been diagnosed with a terminal illness within the past month. Professor Shelby measured their cortisol levels every two weeks over eight months.

- a. Identify the allocation method used to allocate participants to conditions. Explain why this was the only suitable allocation method for Professor Shelby's experiment. (2 MARKS)
- b. In terms of Selye's General Adaptation Syndrome, explain why Professor Shelby measured participants' cortisol levels. (3 MARKS)

Evaluate**Question 23** (3 MARKS)

Evaluate the explanatory power of Selye's General Adaptation Syndrome.

Questions from multiple lessons**Question 24** (1 MARK)

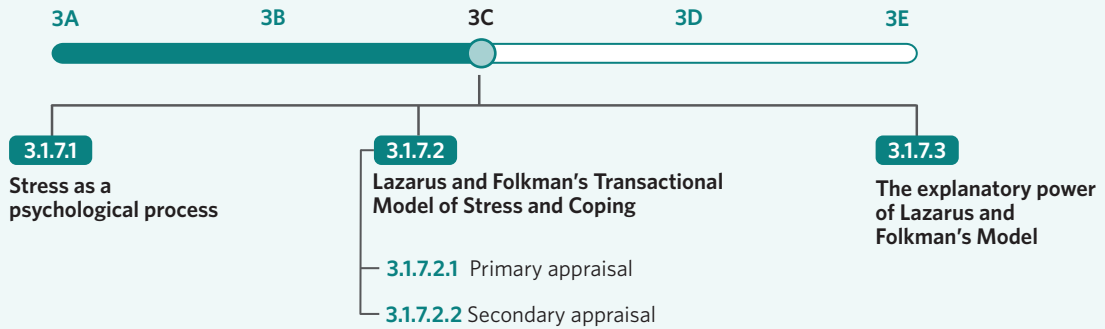
According to Selye's General Adaptation Syndrome, the alarm reaction stage activates which division of the nervous system?

- A. Sympathetic.
- B. Parasympathetic.
- C. Sympathetic, then parasympathetic.
- D. Parasympathetic, then sympathetic.

3C Lazarus and Folkman's Transactional Model of Stress and Coping

STUDY DESIGN DOT POINT

- the explanatory power of Richard Lazarus and Susan Folkman's Transactional Model of Stress and Coping to explain stress as a psychological process (primary and secondary appraisal only)



Do you get stressed by exams while some of your friends don't? In this chapter, you have been looking at how stress can be understood as a psychobiological process. In the last lesson, you examined stress through a biological lens. Now, you will look at stress from a psychological perspective. You will explore Lazarus and Folkman's Transactional Model of Stress and Coping and investigate how it explains the unique nature of stress for each individual.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Subjective something which is based on or influenced by personal feelings or preferences

LESSON LINK

In lesson **3A Stress**, you learnt about the psychological processes involved in the stress response. Lazarus and Folkman's model builds on this knowledge by explaining why individuals may have unique and different responses to the same stressor.

Stress as a psychological process 3.1.7.1

Many psychological factors can influence how an individual perceives and processes stressors. This can affect a person's unique formulation of the stress response.

Theory details

In order to develop a holistic understanding of stress as a psychobiological process, it is important to understand how psychological processes contribute to people's stress responses. Psychological processes refer to mental functions, such as learning, memory and problem-solving (cognitive), and emotions (affective) and have the potential to shape how an individual may interpret stressors. These processes are **subjective** in nature, meaning that interpretations of stressors are based on or influenced by personal feelings or preferences. Psychological processes are unique to every individual and therefore every person will respond to different stressors in different ways.

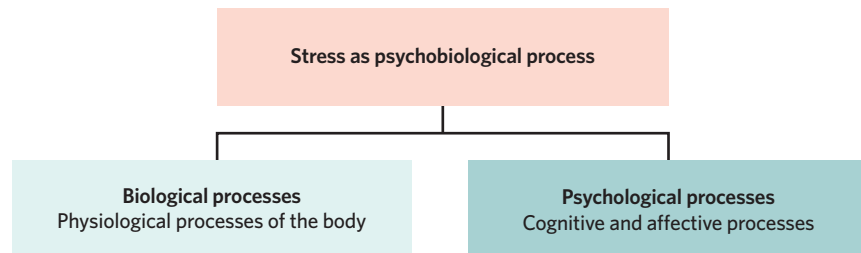


Figure 1 This lesson focuses on the psychobiological process of stress from a psychological perspective

Lazarus and Folkman's Transactional Model of Stress and Coping 3.1.7.2

Lazarus and Folkman's Transactional Model of Stress and Coping is a model that helps to track and interpret an individual's subjective psychological stress response.

Theory details

Lazarus and Folkman's Transactional Model of Stress and Coping proposes that stress is a subjective 'transaction' between an incoming stressor and the personal and environmental factors specific to an individual. The model explains that the unique stress response of an individual results from their **appraisal** (an assessment or evaluation of stimuli) of the nature of the stressor and their belief in their ability to cope with it. According to the model, stress results from a perceived imbalance between the requirements of the stressor and an individual's available coping resources.

Therefore, the model views stress from a psychological perspective because it tracks the subjective cognitive and affective interpretations of stress for an individual.

The complete model is shown in figure 3.

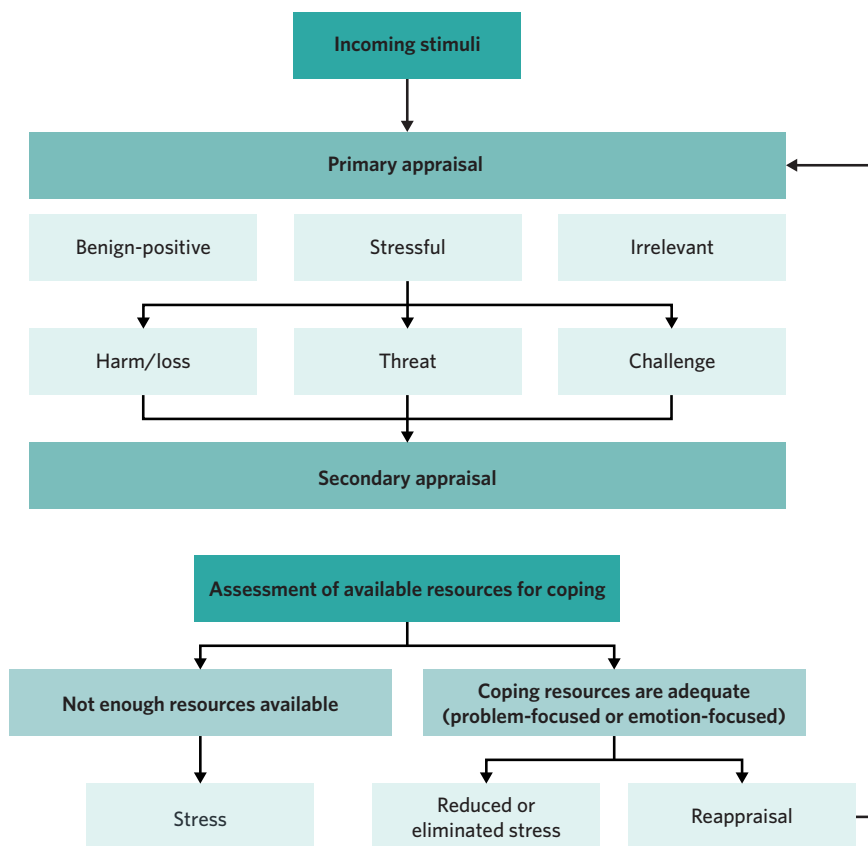


Figure 3 Lazarus and Folkman's Transactional Model of Stress and Coping

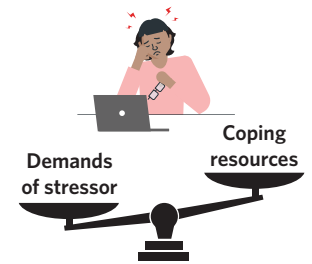


Figure 2 Lazarus and Folkman's Transactional Model of Stress and Coping proposes that an individual experiences stress when coping resources outweigh the demands of the stressor

Appraisal an assessment or evaluation of stimuli

USEFUL TIP

Lazarus and Folkman's model is referred to as being 'transactional' because it explains stress as an 'output' resulting from an 'input'. For example, in a bank transaction, you might enter your pin number and the amount of money you wish to withdraw (an input) in order to get cash (an output). In Lazarus and Folkman's model, the stressor and its appraisals are inputs, which determine the output of an individual's unique stress response.

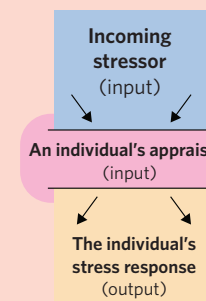


Figure 4 Lazarus and Folkman's model can be understood as a 'transaction'

Primary appraisal

the initial process of evaluating the nature of an incoming stressor, specifically the kind of stress it might cause

Benign-positive an initial appraisal of a stimulus as neutral or good that does not cause stress for the individual

Irrelevant an initial appraisal of a stimulus as a non-issue for the individual

Stressful an initial appraisal of a stimulus as a source of worry or emotional significance for the individual

Harm/loss a further appraisal of a stressor as having caused some damage to the individual

Threat a further appraisal of a stressor as potentially causing damage to the individual in the future

Challenge a further appraisal of a stressor as potentially providing a positive opportunity for growth or change for the individual

USEFUL TIP

Remember, primary appraisal contains two 'substages', each with three different possible appraisals. Only if the individual evaluates the stimulus as 'stressful' in the first substage does the model continue on to further evaluations.

Primary appraisal 3.1.7.2.1

The first stage of the Transactional Model is known as **primary appraisal**, which is the initial process of evaluating the nature of the incoming stressor, specifically the kind of stress it might cause. This is done in two separate substages. Primary appraisal first involves the individual deciding whether or not the incoming stimulus will actually cause them to experience stress. There are three initial ways an incoming stressor can be appraised:

- **Benign-positive.** An initial appraisal of a stimulus as neutral or good that does not cause stress for the individual.
- **Irrelevant.** An initial appraisal of a stimulus as a non-issue for the individual.
- **Stressful.** An initial appraisal of a stimulus as a source of worry or emotional significance for the individual.

The transaction continues only if this initial component of primary appraisal evaluates an incoming stimulus as 'stressful'. Otherwise, the incoming stimulus is disregarded. If considered to be 'stressful', the stimulus (now called a stressor) undergoes further appraisal, being labelled according to the form of stress it causes. Lazarus and Folkman outline three potential forms of stress appraisal:

- **Harm/loss.** A further appraisal of a stressor as having caused some damage to the individual. This means the individual has already experienced direct distress as a result of the stressor.
- **Threat.** A further appraisal of a stressor as potentially causing damage to the individual in the future. This appraisal causes the individual to experience distress, even if the stressor has not directly caused distress yet.
- **Challenge.** A further appraisal of a stressor as potentially providing a positive opportunity for growth or change for the individual.

Figure 5 provides an example of how an individual may subjectively appraise the incoming stressor of a psychology exam in primary appraisal.

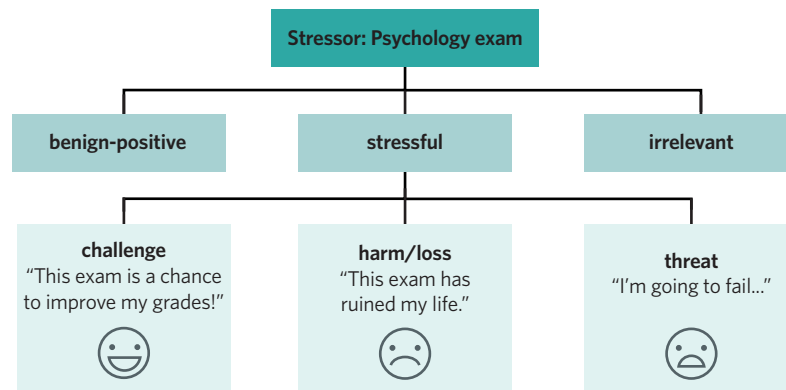


Figure 5 Primary appraisal stages and potential stress reactions to the stimulus of a psychology exam

Secondary appraisal 3.1.7.2.2

After the initial evaluation is made about the nature of the stressor, the individual evaluates the resources required and available in order to cope with a stressor. This process is called '**secondary appraisal**'.

In secondary appraisal, the individual decides what types of coping mechanisms or strategies will be needed to confront a stressor, and whether or not these are available to them. **Coping** refers to the process of dealing with a stressor. As previously mentioned, further stress is created when the individual believes that their coping resources cannot meet the demands of the stressor. Alternatively, if the individual believes they know what resources are needed to cope with the stressor and that these are available to them, this may prevent any further stress.

Lazarus and Folkman's model also details two different kinds of coping strategies individuals may use to deal with a stressor.

- **Emotion-focused coping:** the use of coping strategies that target the emotional components of a stressor, dealing with it indirectly rather than confronting its source.
- **Problem-focused coping:** the use of coping strategies that directly target the source of the stressor, aiming to reduce it in a practical way.

Table 1 Examples of emotion-focused and problem-focused coping strategies

| Emotion-focused coping strategies | Problem-focused coping strategies |
|---|--|
| <ul style="list-style-type: none"> • Wishful thinking; ‘I don’t think my exam will be too hard’. • Denial; ‘I don’t even care about my exam’. • Reframing; ‘This exam is really good practise for future exams’. • Optimism; ‘It will surely turn out for the best’. • Venting emotions; ‘Exam periods are so stressful! I feel overwhelmed!’. • Meditation or distraction. | <ul style="list-style-type: none"> • Seeking information or advice, whether from medical or mental health professionals, or people with relevant knowledge. • Taking action; ‘I will study for four hours a night’. • Time management; creating a plan for how best to invest time into the stressor, like a study timetable. |

Secondary appraisal
the process of evaluating the resources required and available in order to cope with a stressor

Coping the process of dealing with a stressor

Emotion-focused coping
the use of coping strategies that target the emotional components of a stressor, dealing with it indirectly rather than confronting its source

Problem-focused coping
the use of coping strategies that directly target the source of the stressor, aiming to reduce it in a practical way

USEFUL TIP

When coping with stress, both emotion-focused and problem-focused strategies are necessary and effective tools to use. Although emotion-focused coping strategies do not directly address the source of stress, they can still be effective coping mechanisms, especially in situations where problem-focused coping strategies are not sufficient. For example, during COVID-19 lockdowns, you may have found yourself coping by watching your favourite TV show when you were feeling overwhelmed because there were limited ways that you could directly address the stressor of lockdown. Therefore, when you are asked to evaluate coping strategies, make sure you take into account the specific context or scenario, and the results of the specific strategy for the individual.

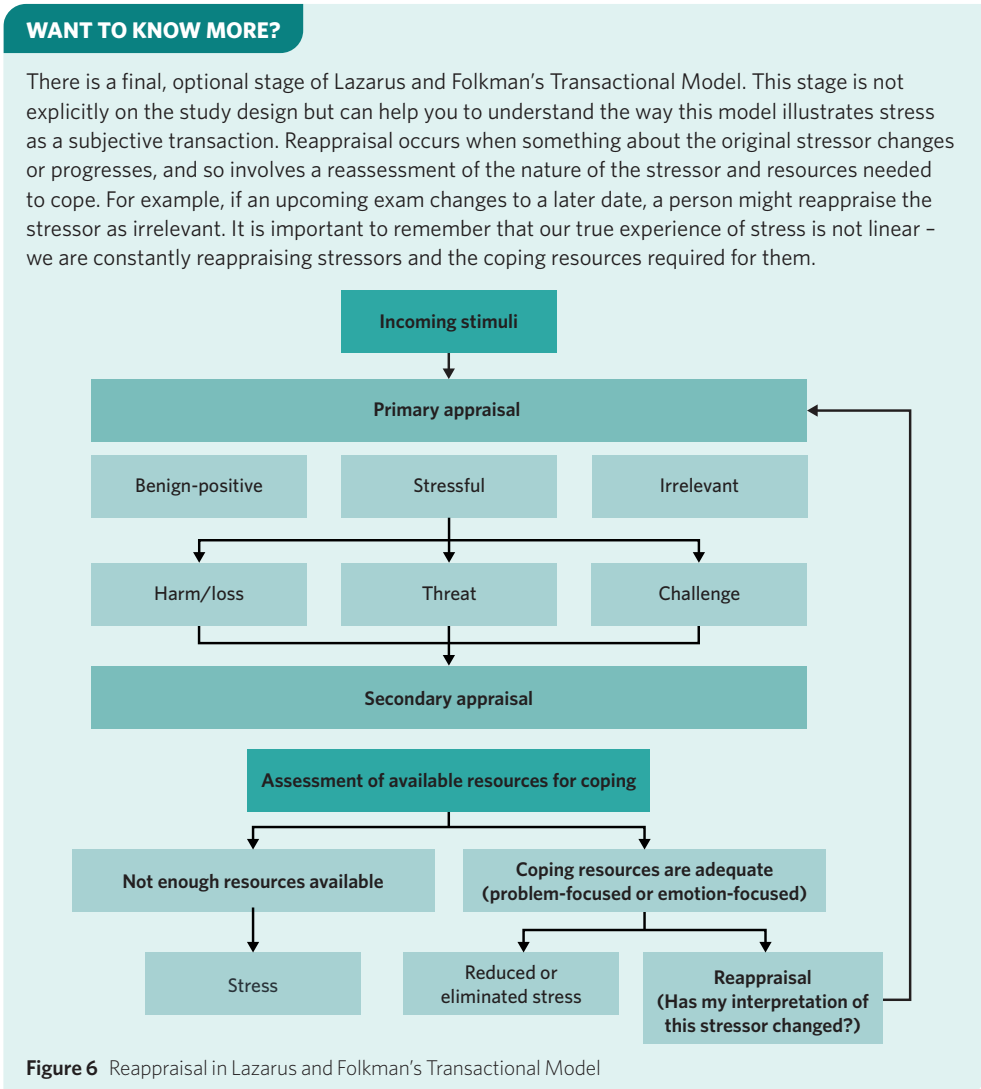


Figure 6 Reappraisal in Lazarus and Folkman’s Transactional Model

The explanatory power of Lazarus and Folkman's Transactional Model of Stress and Coping 3.1.7.3

Lazarus and Folkman's Transactional Model of Stress and Coping is a powerful model to explain why different people react to stress in different ways. However, as with any model, it does not always accurately reflect a true lived experience. Familiarising yourself with some of the model's strengths and limitations will help you to consolidate your understanding of the model as a whole and to develop your critical thinking skills.

Theory details

Lazarus and Folkman's model successfully explains the subjective nature of the stress response, illustrating how and why different people will react to different stressors in different ways. There are many reasons why different individuals may find a particular stimulus stressful, and Lazarus and Folkman's primary appraisal stage explains how a similar stimulus can result in different individual responses. Likewise, Lazarus and Folkman's secondary appraisal stage explains why one person may respond effectively to a stressor while another person may not.

Despite these strengths, as with all models outlining psychological concepts, Lazarus and Folkman's Transactional Model of Stress and Coping also has its limitations. Broadly, although it serves as a useful model to begin to understand some of the psychological processes involved in a person's stress response, there are limitations to the extent that the model accurately reflects the complexities of human psychology.

The strengths and limitations of the model are outlined in table 2.

Table 2 Strengths and limitations of Lazarus and Folkman's model

| Strengths | Limitations |
|--|---|
| <ul style="list-style-type: none"> Allows one to track the subjective stress response of an individual. Allows for consideration of cognitive processes within the stress response, which the biological models do not take into account. Human subjects were used as a source of data during the creation of the model. Helps to explain why the same stressor may have different effects on different people. Coping stage (emotion and problem-focused strategies) provides suggestions for dealing with a stressor. | <ul style="list-style-type: none"> Some argue that the stages of primary and secondary appraisal can occur simultaneously, and so ordering them chronologically may not always be reflective of the true stress response. Individuals are not necessarily aware of why they feel certain kinds of stress, as suggested by primary appraisal. Does not include biological processes of stress, when in practice stress is a combination of both biological and psychological factors. Cannot easily be tested by research, as human subjects are not necessarily consciously aware at all stages of appraisal, and therefore there is a lack of empirical evidence to support the model. |

USEFUL TIP

In lesson **3B Selye's General Adaptation Syndrome**, you learnt about the strengths and limitations of Selye's General Adaptation Syndrome, which is a biological model of stress. As stress is a psychobiological process, neither Selye's model nor Lazarus and Folkman's model will accurately reflect the nature of stress in isolation. As such, what is often a strength of Lazarus and Folkman's model will be a limitation of Selye's model and vice versa.

Theory summary

In this lesson, you have looked at psychological processes of stress, examining Lazarus and Folkman's Transactional Model of Stress and Coping. You should now be able to explain how this model describes the psychological processes of stress, including the details of its primary and secondary appraisal stages. You should also have an awareness of some of the strengths and limitations of the model and be able to differentiate it from biological models of stress.



3C Questions

Theory review

Question 1

Lazarus and Folkman's Transactional Model of Stress and Coping illustrates stress as a biological process.

- A. True.
- B. False.

Question 2

In Lazarus and Folkman's Transactional Model of Stress and Coping, each appraisal stage is _____ and therefore unique to each individual.

Which of the following best fills in the blank?

- A. subjective
- B. objective

Question 3

Which of the following are potential classifications within the stage of primary appraisal? **(Select all that apply)**

- I. Benign-positive.
- II. Stressful.
- III. Irrelevant.
- IV. Harm/loss.
- V. Threat.
- VI. Challenge.
- VII. Problem-based coping.
- VIII. Emotion-based coping.
- IX. Reappraisal.

Question 4

What are the two types of coping mechanisms outlined in Lazarus and Folkman's model?

- A. Approach and avoidance strategies.
- B. Problem-focused and emotion-focused coping strategies.
- C. Stress-reduction and meditation strategies.

Question 5

A limitation of Lazarus and Folkman's Transactional Model of Stress and Coping is that it assumes that individuals have self-awareness about their experience of stress.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. Primary appraisal is the initial process of **evaluating the nature of an incoming** stressor.
- B. Primary appraisal is the initial process of **identifying a particular** stressor.

Question 7

Which of the following is most correct?

- A. Secondary appraisal is a process whereby an individual **evaluates the resources they have available to cope with a stressor.**
- B. Secondary appraisal is a process whereby an individual **chooses between emotion and problem-based coping strategies.**

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 8 and 9.

Australia's young people are not coping with the coronavirus pandemic

According to Baker (2020), two-thirds of young Australians are concerned about the impact the pandemic is having on their education. As a result, they are struggling to cope and often feel ignored in the public debate, which tends to focus on the impact on parents, carers, and the economy when discussing things like school closures.

Baker (2020) reports that, according to UNICEF Australia program and advocacy manager Juliet Attenborough, school-aged children are struggling with their mental health and wellbeing as a result of increased isolation, prolonged screen time, and increased uncertainty about the future.

(Baker, 2020)

Question 8

According to the stage of primary appraisal in Lazarus and Folkman's Transactional Model of Stress and Coping, why are 'two-thirds of young Australians... concerned about the impact the pandemic is having on their education'?

- A. Because they likely view the stressor of the pandemic as stressful and a challenge, as it presents new ways of learning at school.
- B. Because they likely view the stressor of the pandemic as stressful and a threat, as they are struggling to learn and it will impact their future grades.
- C. Because they likely view the stressor of the pandemic as irrelevant and a harm/loss, as they can't do anything about the school they are missing.
- D. Because they likely view the stressor of the pandemic as irrelevant and a threat, as they don't think it should be impacting their education the way it is.

Question 9

In terms of Lazarus and Folkman's stage of secondary appraisal, why are 'school-aged children... struggling with their mental health and wellbeing as a result of increased isolation, prolonged screen time, and increased uncertainty about the future'?

- A. Because emotion-based coping strategies are not adequate to reduce stress.
- B. Because students will likely have too many coping strategies to choose from, making it difficult to pick one.
- C. Because there are limited problem-based coping strategies available to reduce screen time and isolation during the pandemic, and children may not have developed adequate emotion-based coping strategies yet.
- D. Because they have reappraised the situation as a threat.

Exam-style

Remember and understand

Question 10 (1 MARK)

According to Lazarus and Folkman's Transactional Model of Stress and Coping, during primary appraisal there is a/an

- A. use of problem-focused coping.
- B. assessment of whether more coping resources are needed.
- C. use of emotion-focused coping.
- D. assessment of the nature of the stressor.

Question 11 (1 MARK)

In Lazarus and Folkman's Transactional Model of Stress and Coping, the difference between a primary appraisal and a secondary appraisal is that

- A. primary appraisal is subjective, while secondary appraisal is objective.
- B. primary appraisal involves emotion-focused coping strategies, while secondary involves problem-focused.
- C. primary appraisal assesses the nature of the stressor, while secondary appraisal assesses the coping resources available.
- D. primary appraisal assesses the coping resources available, while secondary appraisal reassesses this at a later stage.

Question 12 (1 MARK)

According to Lazarus and Folkman's Transactional Model of Stress and Coping, stress arises when

- A. an individual refuses to cope with an incoming stressor.
- B. an individual believes there is an imbalance between the coping resources available and the demands of a stressor.
- C. an individual appraises the stressor as being irrelevant or harm/loss.
- D. an individual selects emotion-focused coping strategies over problem-focused coping strategies.

Question 13 (2 MARKS)

Describe one strength and limitation of Lazarus and Folkman's Transactional Model of Stress and Coping.

Question 14 (3 MARKS)

Using an example, outline the primary appraisal stage in Lazarus and Folkman's Transactional Model of Stress and Coping.

Apply and analyse

Use the following information to answer questions 15-17.

Thomas recently decided he would learn how to drive. He is quite anxious and overwhelmed about accidents and being able to afford lessons. He considers two options: asking his busy father if he will teach him, or saving up for a lesson.

Question 15 (1 MARK)

According to Lazarus and Folkman's Transactional Model of Stress and Coping, Thomas initially feeling anxious about possible car accidents and being able to afford lessons is an example of a

- A. secondary appraisal, where he considers accidents and financial pressure as a challenge.
- B. primary appraisal, where he considers accidents and financial pressure as a threat.
- C. secondary appraisal, where he considers accidents and financial pressure as a threat.
- D. primary appraisal, where he considers accidents and financial pressure as a challenge.

Question 16 (1 MARK)

When looking into paying for lessons, Thomas worried about how he could make the money to pay for them. Lazarus and Folkman's Transactional Model of Stress and Coping would suggest that Thomas is currently in the stage of

- A. secondary appraisal, where he considers problem-focused approaches for coping with his stressor.
- B. secondary appraisal, where he considers emotion-focused approaches for coping with his stressor.
- C. primary appraisal, where he re-evaluates coping resources available after something about his stressor changed.
- D. primary appraisal, where he first evaluates coping resources available for the stressor.

Question 17 (1 MARK)

Thomas later found out that the price of lessons was very expensive, and felt so anxious about his limited options that he decided not to bother learning to drive just yet. This is an example of

- A. emotion-focused coping, in which Thomas avoided dealing with the stressor.
- B. primary appraisal, in which Thomas considered the price of the lessons a threat.
- C. problem-focused coping, in which Thomas confronted the source of the stressor by avoiding it.
- D. primary appraisal, in which Thomas considered the price of the lessons as harm/loss.

Question 18 (5 MARKS)

Dean and Yasmin just got back from a three-month trip in Europe, during which they spent most of their savings. Although they had a wonderful time, Yasmin is feeling overwhelmed about how she will work and build up her savings when she is back home studying full time. On the other hand, Dean does not have to study again just yet. He is less worried than Yasmin, and is excited to start looking for a new job so that he can begin saving again.

- a. In terms of the primary appraisal stage of Lazarus and Folkman's Transactional Model of Stress and Coping, explain how Dean and Yasmin likely evaluated their situations differently. (3 MARKS)
- b. Describe two emotion-focused coping strategies Yasmin could use to reduce her stress. (2 MARKS)

Questions from multiple lessons

Question 19 (4 MARKS)

Sonya recently moved from England to Australia, beginning at a new school in year 11. She has found it difficult to join a friendship group, and feels like she has lost her old friends from home and a big part of her identity.

- a. In terms of Lazarus and Folkman's primary appraisal stage, explain how Sonya evaluated this kind of stress. (2 MARKS)
- b. As she walked into the school gate on her first day at the new school, Sonya felt her heart begin to race and her breathing speed up. In terms of Selye's General Adaptation Syndrome, identify the stage Sonya is experiencing and justify your response. (2 MARKS)

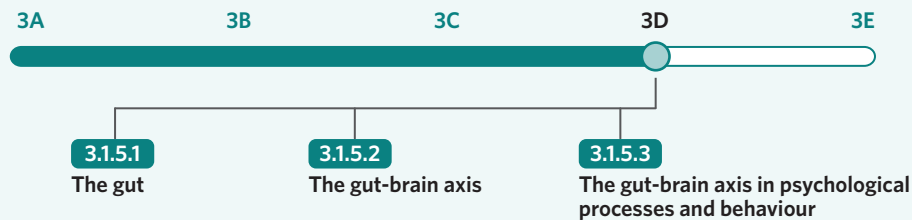
Question 20 (2 MARKS)

Both Lazarus and Folkman's Transactional Model of Stress and Coping and Selye's General Adaptation Syndrome help to track an individual's stress response. In terms of stress as a psychobiological process, explain the key difference between the models.

3D The gut-brain axis

STUDY DESIGN DOT POINT

- the gut-brain axis (GBA) as an area of emerging research, with reference to the interaction of gut microbiota with stress and the nervous system in the control of psychological processes and behaviour



You might have more than one 'brain'. Although this may seem absurd, it has been suggested by some researchers that humans actually have a 'second brain', more commonly known as the gut.

This chapter considers stress as a psychobiological process. In this lesson, you will learn about how psychological aspects and biological aspects interact through the gut-brain axis. You will learn about how the gut influences psychological processes and behaviour, including stress.

The gut 3.1.5.1

You have probably heard of the 'gut' before. But what actually is it? In order to understand the gut-brain axis, you first need to understand what the gut is. Therefore, in this section of the lesson, you will be introduced to the gut.

Theory details

The **gut (also known as the gastrointestinal tract)** refers to the long flexible tube from mouth to anus that is the passageway involved in digestion. The gut is responsible for processing food, absorbing nutrients, and excreting waste (Hornbuckle et al., 2008). The gut is made up of multiple components, these are shown in figure 1.

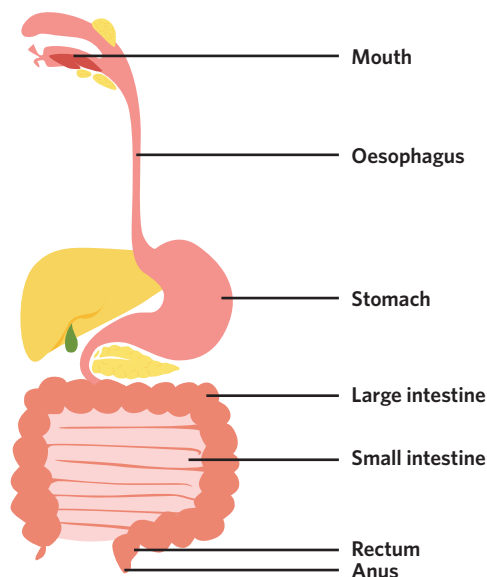
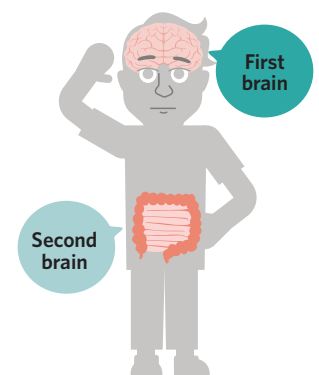


Figure 1 Components of the gut (gastrointestinal tract)



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Gut (also known as the gastrointestinal tract) the long flexible tube from mouth to anus that is the passageway involved in digestion

Gut microbiota all of the microorganisms that live in the gut

Gut microbiome all of the genes of the microorganisms that live in the gut

Within your gut, there are many living microorganisms that help maintain gut health and functioning. These microorganisms typically refer to bacteria, fungi, and viruses. The **gut microbiota** refers to all of the microorganisms that live in the gut, whilst the **gut microbiome** refers to all of the genes of the microorganisms that live in the gut.

The health of the gut can change based on the types and amounts of microorganisms present in the gut. For example, the presence of some types of bacteria (often referred to as ‘good’ bacteria) can result in good gut health, whilst the presence of other types of bacteria (often referred to as ‘bad’ bacteria) can result in poor gut health. When the gut microbiota is imbalanced, meaning there is not enough ‘good’ bacteria and too much ‘bad’ bacteria, it is called gut microbiota dysbiosis (Thursby & Juge, 2017). In contrast, when the gut microbiota is balanced, it is called gut microbiota symbiosis. Additionally, a common term used to describe the composition of gut microbiota is whether it is diverse, meaning there are many different kinds of microorganisms present, or not diverse, meaning there are few kinds of microorganisms present. Typically, a diverse gut microbiota results in better gut health.

WANT TO KNOW MORE?

As you have learnt, the types and amounts of microorganisms present in the gut impact its health. The composition of microorganisms in the gut can change. Some of the factors influencing the types and amounts of microorganisms in the gut include:

- type of diet
- levels of stress
- age
- genetics
- levels of physical activity
- medication.

There are many ways people can influence their gut health based on these factors. For example, by consuming certain foods which contain nutrients, such as yoghurt, people can increase the amount of good bacteria and decrease the amount of bad bacteria in their gut.

The gut-brain axis 3.1.5.2

Often, we are told to ‘trust our gut’ and follow our ‘gut instincts’ in tricky times. Although this may seem like an arbitrary and unreliable way to make decisions, emerging research suggests our gut does play a role in the way our brain works. In this section of the lesson, you will learn about the gut-brain axis.

Theory details

The gut-brain axis is a relatively new and emerging area of research. It involves looking at the connection between the gut and the brain, and how they may interact and influence each other. Specifically, the **gut-brain axis** refers to the bidirectional connection between the gut and the brain through the enteric and central nervous systems.

The **enteric nervous system** refers to the network of nerves in the gut and is a subdivision of the autonomic nervous system. By contrast, the **central nervous system** refers to a major division of the nervous system comprising the brain and spinal cord, which receives neural messages from and transmits neural messages to the peripheral nervous system. Nerves within the enteric nervous system communicate with nerves in the central nervous system, therefore reflecting the relationship between the gut and the brain.

- For example, if an individual has a gut-related condition, such as inflammatory bowel disease, it can influence the neural messages the enteric nervous system sends to the brain in the central nervous system.
- In the same way, if an individual has a brain-related condition, such as depression, it can influence the neural messages the central nervous system sends to the gut in the enteric nervous system.

This reflects the way the gut and the brain communicate through the enteric and central nervous systems and is shown in figure 2.

Gut-brain axis
the bidirectional connection between the gut and the brain through the enteric and central nervous systems

Enteric nervous system
the network of nerves in the gut and is a subdivision of the autonomic nervous system

Central nervous system
a major division of the nervous system comprising the brain and spinal cord, which receives neural messages from and transmits neural messages to the peripheral nervous system

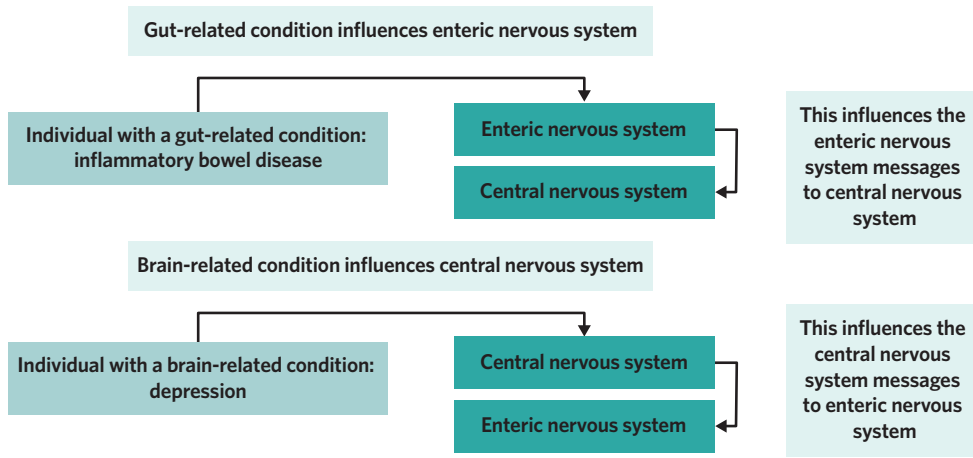


Figure 2 The enteric and central nervous system in the gut-brain axis

As mentioned previously, the gut-brain connection is considered to be a bidirectional relationship, meaning that communication can occur both ways. In this way, the gut can impact the brain and the brain can impact the gut. Figure 3 reflects this two-way relationship.

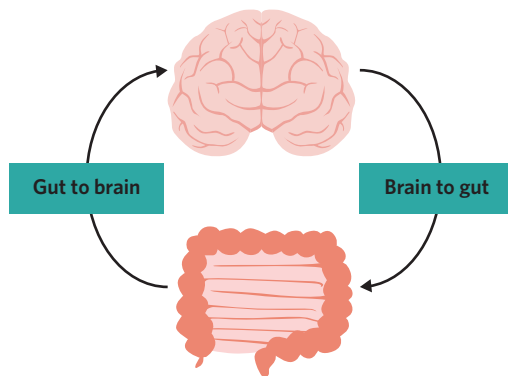


Figure 3 The bidirectional relationship between the gut and the brain

The **vagus nerve** is the longest cranial nerve that connects the gut and the brain, enabling them to communicate. The vagus nerve is responsible for bidirectionally conveying information between the gut and the brain. 10–20% of nerve fibres in the vagus nerve are involved in conveying information from the brain to the gut and 80–90% are responsible for conveying information from the gut to the brain (Breit et al., 2018).

Vagus nerve

the longest cranial nerve that connects the gut and the brain, enabling them to communicate

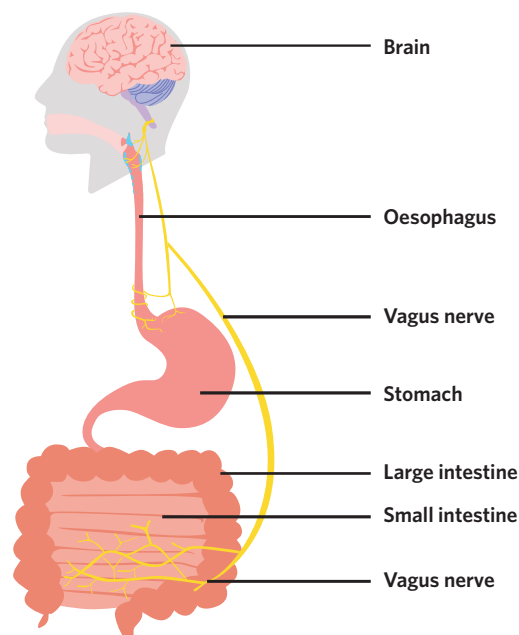


Figure 4 The vagus nerve

The gut-brain axis in psychological processes and behaviour 3.1.5.3

You may have experienced the feeling of having ‘butterflies in your stomach’. This common and familiar phrase highlights the link between the state of the brain and the state of the gut. When we feel anxious, we may experience stomach discomfort, and when we experience stomach discomfort, we may feel anxious. Therefore, having ‘butterflies in your stomach’ reflects the gut-brain connection. In this section of the lesson, you will learn about the gut-brain axis and how it can influence an individual’s psychological processes and behaviour.

Theory details

As you have learnt, due to the bidirectional gut-brain connection, the gut can send messages to our brain. Therefore, the gut can impact our psychological processes and behaviour. Research on the gut-brain axis has suggested there are potential links between the gut and experiences of stress, the presence or absence of mental illness, learning, memory, body weight, and behaviour.

The composition of gut microbiota can impact psychological processes and behaviour. Often, a diverse gut microbiota is associated with greater levels of overall health, therefore having more positive influences on psychological processes and behaviour. Additionally, the presence of ‘good’ bacteria and the absence of ‘bad’ bacteria in the gut microbiota has positive influences on psychological processes and behaviour.

Emerging research

In order to understand the influence of the gut-brain axis on psychological processes and behaviour, we can explore recent studies being conducted on this topic. Some of this emerging research has been done through:

- germ-free animal studies
- comparing microbiota composition in humans
- exploring gut-related diseases and their impacts on cognition and emotion.

Table 1 Emerging research on the gut-brain axis

| | Description and findings |
|---------------------------------|--|
| Germ-free animal studies | <p>A link between the gut microbiota and the brain can be seen through studies on germ-free animals. Germ-free animals are animals that have had microorganisms from their gut microbiota removed. Germ-free animal studies compare certain behaviours and psychological processes in germ-free animals with non-germ-free animals (often referred to as regular or conventional animals).</p> <p>Some findings from germ-free animal studies that indicate the role of gut-brain axis in psychological processes and behaviour include (Mayer et al., 2015):</p> <ul style="list-style-type: none"> • significant changes in anxiety-like behaviour and anxiety responses in germ-free mice • poorer memory function in germ-free mice • increased secretion of stress hormones in germ-free mice • less social engagement and interaction in germ-free mice. <p>One particular study involved implanting microbiota from patients with major depressive disorder (MDD) into germ-free mice and observing the impact of this implantation on mice behaviour. The mice with the implanted microbiota from the patients with MDD began to exhibit depressive-like behaviours (Zheng et al., 2016).</p> <p>This research does not necessarily suggest that germ-free animals are ‘unhealthier’ or ‘healthier’ than conventional animals, as it is just observing psychological and behavioural differences between them. Additionally, although studies on germ-free animals may show some gut-brain influence on psychological processes and behaviour, they are difficult to generalise to humans.</p> |

Continues ►

Table 1 Continued

| | Description and findings |
|---|--|
| Microbiota composition in humans | <p>Some studies have compared the microbiota in healthy individuals and individuals with different psychological or behavioural patterns or experiences. Research has suggested that the composition of gut microbiota can influence the likelihood of experiencing:</p> <ul style="list-style-type: none"> • autism spectrum disorder (Garcia-Gutierrez et al., 2020) • mental disorders, including depressive disorders, anxiety disorders, and psychotic disorders (Kelly et al., 2016; Lee & Kim, 2021) • cognitive decline (Proctor et al., 2016). <p>One of the more well-known gut-brain axis topics is the potential link between the gut microbiota and the stress response. Stress can influence the gut microbiota and the gut microbiota can also influence the likelihood of experiencing stress, reflecting the bidirectional relationship between the gut and the brain. For example, studies show that experiencing stress can negatively impact the diversity and composition of an individual's gut microbiota (Molina-Torres et al., n.d.; Madison et al., 2019). Likewise, having an unhealthy gut microbiota is linked to higher stress levels (Dinan et al., 2012). The gut-brain connection can also explain why an individual may experience digestive discomfort when experiencing stress, or on the other hand, may experience stress when experiencing digestive discomfort.</p> |
| Gut-related diseases | <p>Some emerging research focuses on individuals with gut-related diseases and their experiences of anxiety, depression, and other cognitive and/or emotional problems. Two of these gut-related diseases that have been discussed in research are irritable bowel syndrome and inflammatory bowel disease. There are potential links between the presence of these gut-related diseases and the presence of anxiety and depression symptoms (Abautret-Daly et al., 2017; Whitehead et al., 2002). Therefore, experiencing a gut-related disease may increase the likelihood of experiencing a mental illness.</p> |

Because the gut-brain axis is an emerging area of research, it is important to understand that this research is constantly evolving and improving, which means it is difficult to make definitive statements and draw conclusions. For example, it is incorrect to say that the composition of gut microbiota causes an individual to experience stress or to develop a mental illness, rather, it is more correct to say that emerging research suggests there are some possible connections between these concepts. Additionally, as new research emerges, some gut-brain axis studies have presented contradictory results. For example, a study with one strain of mice indicated that there was less social engagement and interaction in germ-free mice (Mayer et al., 2015), whereas another study with a different strain of mice indicated that there was a normal level of social engagement and interaction in germ-free mice (Luczynski et al., 2016). This highlights the gut-brain axis is a new and dynamic area of research.

Theory summary

In this lesson you learnt about the gut-brain axis. Figure 5 presents a summary of this lesson.

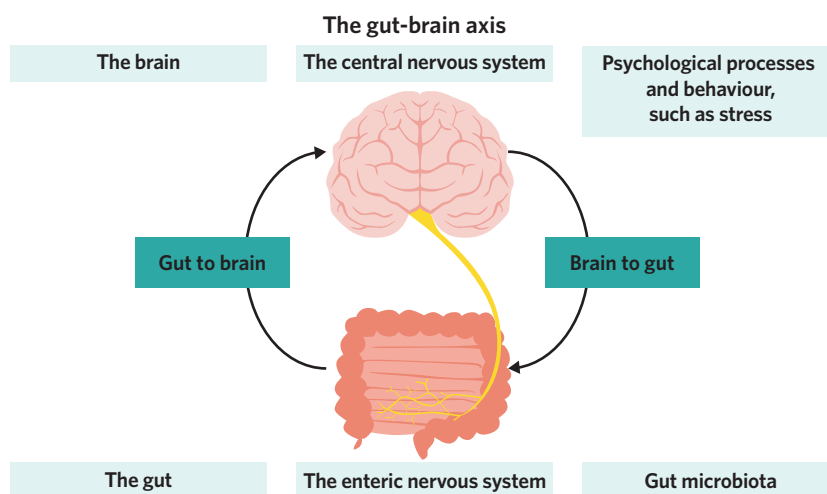


Figure 5 Summary of the gut-brain axis

3D Questions

Theory review

Question 1

The gut is involved in digestion and is made up of many different parts.

- A. True.
- B. False.

Question 2

The gut-brain axis suggests that there is a connection between which of the following? **(Select all that apply)**

- I. The gut and the brain.
- II. The gut and the spinal cord.
- III. The enteric nervous system and the central nervous system.
- IV. The central nervous system and the brain.

Question 3

The gut can send messages to the brain but the brain cannot send messages to the gut.

- A. True.
- B. False.

Question 4

The gut-brain axis suggests there are some links between the composition of gut microbiota and which of the following? **(Select all that apply)**

- I. Stress.
- II. Mental illness.
- III. Cognitive decline.
- IV. Eye colour.

Question 5

It has been proven that the composition of gut microbiota can directly cause an individual to experience stress.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. The gut-brain axis refers to the **relationship** and **communication** between the gut and the brain through the enteric and central nervous systems.
- B. The gut-brain axis refers to the **differences** and **separation** between the gut and the brain through the enteric and central nervous system.

Question 7

Which of the following sentences is most correct?

- A. The gut microbiota is all of the microorganisms that **live** in the **gut**.
- B. The gut microbiota is all of the microorganisms that **form** in the **gut-brain axis**.

Question 8

Which of the following sentences is most correct?

- A. The enteric nervous system refers to **a section** of nerves in the gut.
- B. The enteric nervous system refers to **the network** of nerves in the gut.

Text analysis

The following assessment skills type reflects the study design assessment dot point:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 9–11.

Media text 1

There is a potential link between gut health and neurological disorders. However, this is a very new idea and is not fully backed by scientific evidence, as the microbiome and microbiota are not yet well understood. Faecal transplants are an emerging topic of interest regarding gut health, and mental and neurological disorders. Faecal transplants are just as they are titled; they involve transplanting faecal matter from a healthy individual to an unhealthy individual to improve the gut microbiota of the unhealthy individuals. Ms Yap, a woman completing her medical degree and PhD at The University of Queensland, refers to faecal transplants as a 'so-called therap[y]' and suggests that the hype around these fad treatments is potentially misleading.

(Pollard & Miles, 2021)

Media text 2

Believe it or not, but Tony's seemingly never-ending battle with bipolar disorder was drastically improved by faecal transplants. Tony's depressive and manic episodes reduced after he received a faecal transplant from a healthy individual. Similarly, Jane, who was being hospitalised several times a year due to her bipolar disorder, found that after faecal transplants, her symptoms improved significantly. The link between gut health and mental illnesses is still being researched and faecal transplants are still very far from being an approved clinical treatment for mental illnesses, but they are nevertheless attracting significant interest in the health field. Some people are even taking tablets called 'crapsules', which contain faecal matter from healthy donors, to improve depressive symptoms.

(Smith, 2022)

Question 9

Which of the following statements best explains why faecal transplants may help mental and neurological disorders?

- A. Faecal transplants may improve an individual's gut microbiota which, due to the gut-brain axis, can worsen mental and neurological functioning.
- B. Faecal transplants may improve an individual's gut microbiota which, due to the gut-brain axis, can help improve mental and neurological functioning.
- C. Faecal transplants may reduce an individual's gut microbiota which, due to the enteric nervous system, can help improve mental and neurological functioning.
- D. Faecal transplants may improve an individual's gut-brain axis.

Question 10

Which of the following best reflects the main findings reported in Media text 2?

- A. There is a link between the improvement of gut microbiota and the improvement in bipolar disorder and depressive symptoms.
- B. There is a link between having diverse gut microbiota and having bipolar disorder and depressive symptoms.
- C. There is a link between unhealthy gut microbiota and the lack of bipolar disorder and depressive symptoms.
- D. There is a link between gut health and brain health.

Question 11

Which of the following ideas is reflected in **both** articles (Media text 1 and Media text 2)?

- A. Faecal transplants can help improve depressive symptoms.
- B. Faecal transplants are not interesting in the health field.
- C. Faecal transplants are likely to be a fad treatment and are misleading.
- D. The link between gut health and psychological processes and behaviour is still being researched.

Exam-style**Remember and understand****Question 12** (1 MARK)

Which of the following statements about the gut-brain axis is most correct?

- A. The gut-brain axis refers to the communication from the gut to the brain.
- B. The gut-brain axis refers to the gut being responsible for many diseases.
- C. The gut-brain axis refers to the bidirectional connection between the gut and the brain.
- D. The gut-brain axis refers to the microorganisms in the gut and the brain.

Question 13 (1 MARK)

The gut microbiota is

- A. all of the microorganisms that live in the gut.
- B. all of the microorganisms and their genes that live in the gut.
- C. all of the microorganisms in the gut-brain axis.
- D. a select portion of the microorganisms that live in the gut.

Question 14 (1 MARK)

The bidirectional nature of the gut-brain axis means that

- A. the gut can send messages to two areas of the body; the brain and the spinal cord.
- B. the gut can send messages to the brain and the brain can send messages to the gut.
- C. the brain can send messages to the gut and the gut can store these messages.
- D. the brain can send messages to the spinal cord and then to the gut.

Question 15 (1 MARK)

Aadya has an unhealthy gut microbiota. How might this affect Aadya's stress levels?

- A. Aadya's stress levels will not change because there is no evidence that stress levels are related to unhealthy gut microbiota.
- B. Aadya's stress levels are guaranteed to increase because there is evidence that stress levels increase when the gut microbiota is unhealthy.
- C. Aadya's stress levels have the potential to increase because there is some emerging evidence to suggest that stress levels may increase when the gut microbiota is unhealthy.
- D. Aadya's stress levels will decrease because an unhealthy gut microbiota means she has less microbiota which can reduce stress.

Question 16 (1 MARK)

Outline what the enteric nervous system is.

Question 17 (2 MARKS)

With reference to emerging research, describe the gut-brain axis.

Question 18 (2 MARKS)

Identify one way the gut-brain axis may influence psychological processes and behaviour. Justify your response.

Apply and analyse

Question 19 (1 MARK)

Which of the following situations reflects a correct example of the impact of the gut-brain axis on psychological processes and/or behaviour?

- A. Clara has a diverse gut microbiota, which means it is healthy, therefore she is less likely to experience cognitive decline.
- B. Clara does not have a diverse gut microbiota, which means it is unhealthy, therefore she is less likely to experience cognitive decline.
- C. Clara does not have a diverse gut microbiota, which means it is unhealthy, therefore she is less likely to experience stress.
- D. Clara has a diverse gut microbiota, which means it is healthy, therefore she is more likely to experience stress.

Question 20 (4 MARKS)

Billy has irritable bowel syndrome (IBS), a health condition related to the gut, and an anxiety disorder. Sometimes Billy's irritable bowel syndrome will get worse when he is feeling anxious.

With reference to the gut-brain axis, describe how Billy's two health conditions may impact each other.

Evaluate

Question 21 (4 MARKS)

A research study investigated the different types of microorganisms in an individual's gut microbiota with major depressive disorder. The study aimed to see if there were any differences between the gut microbiota between those with and without major depressive disorder. The study examined the gut microbiota of a group of healthy individuals with no diagnosis or history of mental illness and a group of individuals with a diagnosis of major depressive disorder. The individuals in both groups ranged from ages 18 to 25 and were not categorised by sex.

- a. With reference to the gut-brain axis, suggest the potential results of this study. (3 MARKS)
- b. Identify one potential extraneous variable in this study. (1 MARK)

Questions from multiple lessons

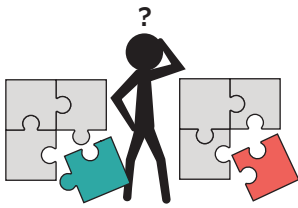
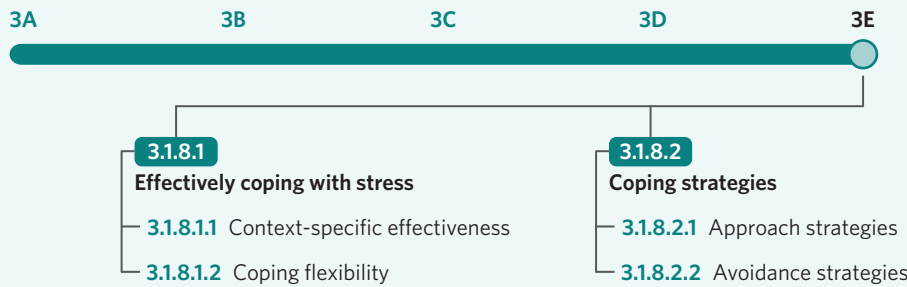
Question 22 (3 MARKS)

Describe external stressors and explain how an example of an external stressor may influence the gut.

3E Coping with stress

STUDY DESIGN DOT POINT

- use of strategies (approach and avoidance) for coping with stress and improving mental wellbeing, including context-specific effectiveness and coping flexibility



When you feel stressed, what do you usually do to make yourself feel better? While some people like to vent to their friends, go for a run, or tackle the problem head-on, it's likely that your answer to the above question depends on what kind of stress you are experiencing.

In this chapter, you have looked at stress as a psychobiological process. In this lesson, you will look at how people may effectively cope with stress and improve their mental wellbeing.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Coping the process of dealing with stress

Mental wellbeing an individual's current state of mind, including their ability to think, process information, and regulate emotions

Effectively coping with stress 3.1.8.1

To effectively cope with different stressors, an individual must be able to assess the needs of each stressor and respond accordingly. Two components of effective coping include the ability to exhibit context-specific effectiveness and coping flexibility.

Theory details

Coping refers to the process of dealing with stress. People deal with stress in many different ways. Some coping mechanisms help to directly confront or reduce the source of stress, while others help manage emotions associated with particular stressors. These strategies not only reduce stress, but are also vital to improving overall individual **mental wellbeing**, which includes an individual's current state of mind, including their ability to think, process information, and regulate emotions effectively.

LESSON LINK

In lesson **3C Lazarus and Folkman's Transactional Model of Stress and Coping**, you learnt about secondary appraisal, in which individuals evaluate the coping resources required and available to deal with a particular stressor. In this lesson, you will learn more about what effective coping looks like and how people can use these strategies to improve their stress levels and general wellbeing.

Context-specific effectiveness 3.1.8.1.1

The ability to reduce and eliminate stress efficiently and effectively is important to maintain an individual's mental wellbeing. The best coping mechanisms depend not only on the type of stress experienced, but also on situational factors such as the individual's unique personality and needs, and the environment surrounding the stressor. Therefore it is ideal to use a coping strategy that takes into account a range of these contextual factors, rather than using a one-size-fits-all approach.

Context-specific effectiveness refers to when the coping strategy or mechanism used is appropriate for the unique demands of the stressor. In other words, the effectiveness of a particular strategy depends upon where and when it is used. A strategy that demonstrates context-specific effectiveness ensures that there is a good balance or 'fit' between the coping strategy used and the specific situation of the individual. For example, if the source of stress is an upcoming psychology SAC on the topic of the central nervous system, the specific context of each student will differ. Therefore, the most effective coping strategy will be different for a student that has already studied the content, compared to one who has not. This is detailed in table 1.

Context-specific effectiveness when the coping strategy or mechanism used is appropriate for the unique demands of the stressor

Table 1 A comparison of how two individuals need to use different coping strategies to achieve context-specific effectiveness

| | Student one | Student two |
|--|--|---|
| Stressor | SAC on the central nervous system (CNS) | SAC on the central nervous system (CNS) |
| Individual circumstance | Has never studied the CNS | Has studied the CNS twice |
| Context-specific coping mechanism/s to effectively reduce stress: | <ul style="list-style-type: none"> • Seek help from teacher • Create summary notes | <ul style="list-style-type: none"> • Create a study timetable • Self-test |

In this scenario, the demands of the stressor are different for the two individuals, so the most effective coping strategy must be specific to the different *contexts* that each student is facing. For example, student one in this scenario must study more than student two to effectively meet the demands of the stressor. This is taking into account their relative situations and individual characteristics. In this case, their respective knowledge is the most important factor that influences what are the most effective strategies.

This is not only applicable to individuals. In some cases, a singular person may need to use different coping strategies to address a similar stressor in different situations or at different times. For example, a high-school student may be balancing their studies, a part-time job, after-school activities, and family commitments, causing homework to become a stressor. Table 2 outlines how this stressor may be dealt with in different ways (by the same person) according to the unique context it is experienced in.

Table 2 A comparison of how the same individual may use different coping strategies to achieve context-specific effectiveness

| Time of year | Term 1 | Term 4 |
|--|--|---|
| Stressor | Completing homework | Completing homework |
| Specific circumstance | <ul style="list-style-type: none"> • Two after-school work shifts per week • One sports training session per week • One upcoming SAC • One tutoring session per week | <ul style="list-style-type: none"> • Two after-school work shifts per week • Two sports training sessions per week (approaching the final of a competition) • Three upcoming SACs • No tutoring (tutor unavailable) |
| Context-specific coping mechanisms to effectively reduce stress | <ul style="list-style-type: none"> • Create a study timetable • Seek help from tutor | <ul style="list-style-type: none"> • Reduce work shifts for the week before the SACs (giving more time to study) • Seek help from teacher or friends • Create a study timetable |

As can be seen in table 2, the same individual may need different coping strategies depending on where and when they are encountering a particular stressor and who is available to support them. The same coping strategy may not be as effective in different situations.

Coping flexibility
 an individual's ability to adjust or change their coping strategies depending on the unique and changing demands of a stressor

Coping flexibility 3.1.8.1.2

Coping flexibility refers to the ability to adjust or change one's coping strategies depending on the unique and changing demands of a stressor. Someone's first choice of coping strategy may no longer be the most effective if something about the individual, environment, or stressor changes, or if one's initial choice of strategy hasn't provided any relief. Coping flexibility is demonstrated when a person can change their coping strategies in situations like these. For example, if student two from table 1 became sick a few days before the SAC, they may need to consider an alternative coping approach. Depending on how sick they are, they may need to ask their teacher if they can reschedule their SAC to a later date, spreading their study out over those extra days while making sure to eat and sleep well for optimal performance.

Having high levels of coping flexibility ensures that an individual can achieve context-specific effectiveness, and leads to greater levels of general wellbeing as individuals are able to adjust their approach to many different situations.

Coping strategies 3.1.8.2

Coping strategies are the ways that people deal with stress. You will learn about two different categories of coping strategies: approach strategies and avoidance strategies.

Theory details

There are two different coping strategies that you will learn about in this lesson:

- approach strategies
- avoidance strategies.

Approach strategies 3.1.8.2.1

Approach strategies are coping strategies that directly confront the source of the stress and thus reduce or eliminate it. These strategies generally deal with stress in a practical way. For example, studying for a psychology SAC directly deals with the stressor by equipping an individual with the knowledge and skills to successfully complete it. Some examples of approach strategies are detailed in table 3.

Avoidance strategies 3.1.8.2.2

Avoidance strategies are coping strategies that involve evading or distancing oneself from the source of stress. These strategies often deal with the more emotional components of stress, channelling thoughts and behaviour away from the stressor. Some examples of avoidance strategies are detailed in table 3.

Approach strategies
 coping strategies that directly confront the source of the stress

Avoidance strategies
 coping strategies that evade the stressor, seeking to indirectly reduce stress

Table 3 Examples of approach and avoidance strategies

| Approach strategies | Avoidance strategies |
|---|--|
| <ul style="list-style-type: none"> • Making a list of pros and cons • Seeking professional advice or counselling and implementing strategies • Making a plan and executing it • Making a list of ways to approach the stressful situation | <ul style="list-style-type: none"> • Denial • Wishful thinking • Re-evaluation • Substance abuse • Venting emotions • Distraction • Sleeping and eating |

USEFUL TIP

While avoidance strategies do not directly confront the source of stress, this does not mean that they are necessarily less effective. Depending on the type of stressor, avoidance coping might be more appropriate than approach coping. For example, if an individual is dealing with the death of a friend but also has an upcoming exam, distraction might be temporarily necessary during such an emotionally difficult time; hanging out with friends (an avoidance strategy) in order to improve mood and work towards studying at a later point (an approach strategy) may be the best plan. When evaluating coping strategies in exam questions, make sure you take into account the specific context and needs of the individual.

Figure 1 details how the stressor of a psychology SAC may be dealt with using either approach or avoidance strategies.

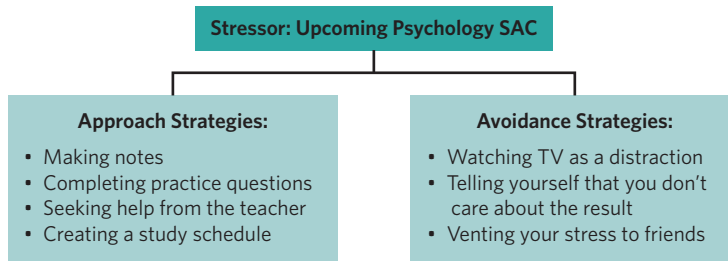


Figure 1 Approach and avoidance strategies that may be used to deal with a psychology SAC

USEFUL TIP

You may have noticed a similarity between Lazarus and Folkman's secondary appraisal stage in lesson 3C **Lazarus and Folkman's Transactional Model of Stress and Coping** and the forms of coping described in this lesson. Be careful! If you are asked about coping strategies in general, make sure to use the terms 'approach' and 'avoidance' strategies, rather than Lazarus and Folkman's 'emotion-focused' and 'problem-focused' coping, unless the question specifically asks you to refer to the Transactional Model of Stress and Coping.

Theory summary

In this lesson, you have learnt about concepts related to coping with stress. You should now be familiar with the core ideas of context-specific effectiveness and coping flexibility, and be able to explain that these promote effective coping and mental wellbeing. You have also covered two specific categories of coping strategies: approach and avoidance strategies. You should now be able to recognise and explain these, and identify when it is most appropriate to use each one.

3E Questions

Theory review

Question 1

The two categories of coping strategies are approach and avoidance strategies.

- A. True.
- B. False.

Question 2

When you consider the unique demands of the stressor and the situation in which it occurs, you are demonstrating _____.

Which of the following best fills in the blank?

- A. coping flexibility
- B. context-specific effectiveness

Question 3

Adapting coping strategies when the ones you are using are not working is known as _____.

Which of the following best fills in the blank?

- A. coping flexibility
- B. context-specific effectiveness

Question 4

Which of the following are considered approach strategies? (Select all that apply)

- I. Making and executing a plan.
- II. Seeking professional counselling.
- III. Distracting yourself.
- IV. Sleeping.
- V. Actively addressing the source of stress.

Assessment skills

Perfect your phrasing

Question 5

Which of the following sentences is most correct?

- A. Approach strategies directly confront the source of the stressor, whereas **avoidant** strategies evade the stressor, seeking to indirectly reduce stress.
- B. Approach strategies directly confront the source of the stressor, whereas **avoidance** strategies evade the stressor, seeking to indirectly reduce stress.

Question 6

Which of the following sentences is most correct?

- A. Coping flexibility leads to context-specific effectiveness, as being able to **easily adapt** your coping mechanisms means that you can **choose the best strategy for the particular situation**.
- B. Coping flexibility leads to context-specific effectiveness, as being able to **choose** your coping mechanisms means that you can **use approach and avoidance strategies properly**.

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 7–9.

The March 2022 floods in Queensland and New South Wales have had devastating impacts, with almost 5,000 houses across the area deemed to be uninhabitable, while many more have been damaged (Ludlow, 2022). The damage due to the storm, in conjunction with having to evacuate so quickly, has led to immense stress amongst the flood-damaged communities. Below, the experiences of two individuals impacted by the floods are outlined.

Chris Trew, a Lismore resident, was starting to repair his house from the floods in early March 2022 when an evacuation order was reinstated on March 30th. Prior to the evacuation order being reinstated, he said that people were starting to gain positivity. However, now people have decided that 'enough's enough' after the money they spent on repairs will get ruined again (Chenery, 2022). Even though the last month has been devastating, Chris said 'there's no point in crying – you just [have] to keep going'.

Todd Ballard, who lives in Rocklea, is struggling after many personal items such as 'valuables and antiques' have been damaged (The Project, 2022). Todd is particularly struggling with the potential damage to the container which held his sister's ashes. While holding back tears, he stated that he 'hasn't got to [looking at the container] yet' and is 'working on it'. He said that he 'doesn't want to open the door' to the room where the ashes have been kept due to the likelihood that the ashes have been destroyed.

Question 7

The above case study outlines two different responses to the immensely stressful floods. In comparing Chris and Todd's coping strategies, which of the following statements is true?

- A. Chris is relying on avoidance strategies as he is ignoring the problem at hand, whereas Todd is relying on approach strategies because he is 'working on' entering the room where his sister's ashes were stored.
- B. Chris is relying on approach strategies because he says 'you just have to keep going', whereas Todd is relying on avoidance strategies because he 'doesn't want to open the door'.
- C. Both Chris and Todd are relying on approach strategies because they have no choice but to deal with the consequences of the flood.
- D. Both Chris and Todd are relying on avoidance strategies, as Chris is no longer engaging with his emotions ('there's no point crying') and Todd 'doesn't want to open the door'.

Question 8

To achieve coping flexibility, Todd could

- A. continue to avoid the room his sister's ashes are kept in.
- B. consider whether avoiding the room is helping him to deal with his stress.
- C. ask a friend for support when cleaning out the room.
- D. None of the above.

Question 9

In cases of natural disasters like the floods in this case study, which of the following are the most important aspects to consider when determining which coping strategies meet the requirements of context-specific effectiveness?

- A. Geographical location.
- B. Access to resources.
- C. Experience in previous natural disasters.
- D. All of the above.

Exam-style**Remember and understand****Question 10** (1 MARK)

Context-specific effectiveness is when there is a good balance between

- A. the coping mechanism used and the individual experiencing stress.
- B. the coping mechanism used and the demands of the stressor.
- C. the demands of the stressor and how an individual perceives them.
- D. the demands of the stressor and the environment the stressor occurs in.

Question 11 (1 MARK)

The difference between approach and avoidance strategies of coping is that

- A. approach strategies confront a stressor, whereas avoidance strategies actively evade a stressor.
- B. approach strategies actively evade a stressor, whereas avoidance strategies confront a stressor.
- C. approach strategies deal with emotional components of a stressor, whereas avoidance strategies deal with behavioural components.
- D. approach strategies reduce the stressor, whereas avoidance strategies do not.

Question 12 (3 MARKS)

Using an example, outline how having coping flexibility can help a person deal with a stressor.

Apply and analyse

Question 13 (2 MARKS)

Naima's mum broke her leg and was in a cast for six weeks. As a result, Naima had to help out more around the house and look after her siblings, causing her to fall behind in her school work.

Identify one approach and one avoidance coping strategy that Naima could use to manage her stress.

Use the following information to answer questions 14 and 15.

Dom had to give a speech at a school assembly in front of 1000 people. Two days before, he had no idea what he would say and so instead worked on other things and took his dog, Tojo, for a walk. When walking Tojo, an idea for his speech came to him and so he quickly walked home and wrote down a speech.

Question 14 (1 MARK)

The coping strategies Dom used before the idea for his speech came to him can be considered as

- A. avoidance strategies.
- B. approach strategies.
- C. coping flexibility.
- D. context-specific effectiveness.

Adapted from VCAA Psychology exam 2017 Q23

Question 15 (1 MARK)

Dom walking home quickly after thinking of an idea for his speech **cannot** be considered as

- A. an approach strategy.
- B. context-specific effectiveness.
- C. an avoidance strategy.
- D. coping flexibility.

Question 16 (7 MARKS)

Genevieve has a young daughter Maddy who has been sick with a cold for the last five days. Despite Maddy still being sick, Genevieve is relieved on Monday when she can drop Maddy off at kindergarten and have a break from nursing her. When Genevieve picked Maddy up at the end of the day, she realised Maddy was even sicker than before and so booked her a doctor's appointment for the following day.

- a. When Genevieve dropped Maddy off even though she was sick at kindergarten on Monday, what kind of coping strategy was Genevieve using? Justify your response. (2 MARKS)
- b. When Genevieve booked Maddy a doctor's appointment, what kind of coping strategy did she use? Justify your response. (2 MARKS)
- c. Explain how Genevieve demonstrated coping flexibility in this scenario. (3 MARKS)

Questions from multiple lessons

Use the following information to answer questions 17 and 18.

Archie has recently been diagnosed with depression and anxiety and has been struggling to cope with various stressors in his life. He is particularly stressed about school, and every time he thinks about the work he needs to do his stomach begins hurting and he feels overwhelmed. Archie loves sports and has been relieving his stress by playing football with his local team, attending extra training sessions to distract himself. However, the football season ended two weeks ago and Archie no longer has training and games. Archie notices that he is feeling more stressed than usual, so he has decided to go for a jog every day instead of playing football.

Question 17 (1 MARK)

Archie trying out jogging to relieve his stress is an example of which of the following processes?

- A. Context-specific effectiveness.
 - B. Avoidance coping.
 - C. Coping flexibility.
 - D. Approach coping.
-

Question 18 (2 MARKS)

Referring to the gut-brain axis, explain why Archie may suffer from a sore stomach when he feels stressed.

Question 19 (5 MARKS)

Janet recently separated from her husband and they are both now moving out of their shared home to live independently. Janet works full time and has a major work review coming up, which will take 40 hours of preparation over the next two weeks. Her deadline for moving out is also in two weeks. Janet has been working non-stop on clearing out her stuff, as well as her work, and is naturally very upset about the separation. In the past few days, she has felt overwhelmed by her stress and is finding it difficult to keep up with her demands. She has also noticed that she is getting sick, further adding to her stress. Over the past few days, Janet has been going for a run in the evening to distract herself from the burden of her stressors.

- a. Using the language of Selye's General Adaptation Syndrome, describe which stage of stress Janet is currently experiencing. (2 MARKS)
- b. In terms of context-specific effectiveness, is going for a run an appropriate coping strategy for Janet? Justify your response. (3 MARKS)

Chapter 3 review

Chapter summary

This chapter was all about how we experience stress. As you now know, stress has both psychological and biological components, and there are different ways to approach coping with stress.

In lesson **3A Stress**, you learnt about a range of internal and external stressors that cause stress responses. You also learnt about particular biological stress responses, including:

- the flight-or-fight-or-freeze response in acute stress.
- the role of cortisol in chronic stress.

In lesson **3B Selye’s General Adaptation Syndrome**, you learnt about a biological model of stress that explains bodily responses to stress over time. The model specifically covers three main stages:

- alarm reaction (shock and countershock)
- resistance
- exhaustion.

In lesson **3C Lazarus and Folkman’s Transactional Model of Stress and Coping**, you learnt about a psychological model of stress that explains how an individual may assess stressful situations, and the relationship between stress and coping. The model specifically covers two main stages:

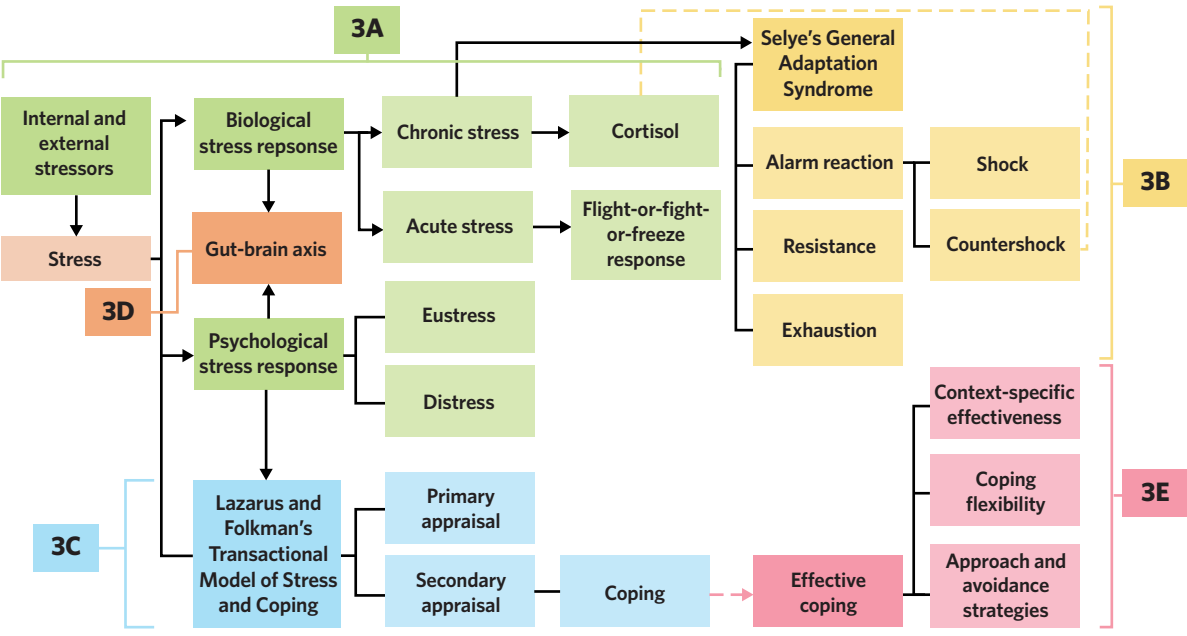
- primary appraisal
- secondary appraisal.

In lesson **3D The gut-brain axis**, you learnt about this emerging area of research that demonstrates how our brain and gut work together in the stress response. In particular, you learnt about:

- the gut
- gut microbiota
- the enteric nervous system
- the central nervous system.

In lesson **3E Coping with stress**, you learnt about effective mechanisms for coping with stress and improving overall wellbeing. In particular, you learnt about the following concepts:

- context-specific effectiveness
- coping flexibility
- approach strategies
- avoidance strategies.

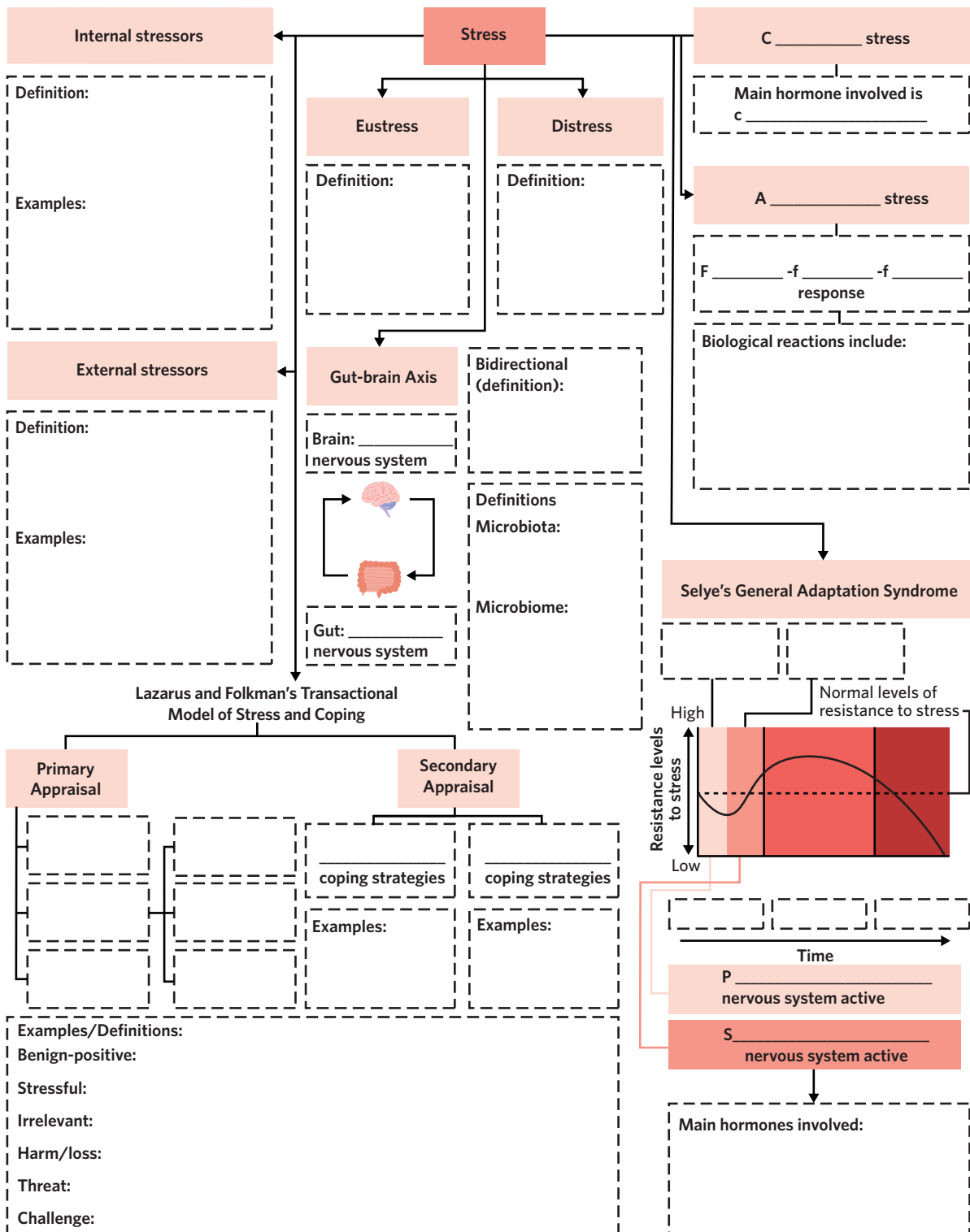


Chapter review activities

Review activity 1: Mindmap

Copy out the following mindmap onto a piece of paper.

1. Add definitions and examples to the concepts outlined in the mind map below.
2. Add an image or an icon to each key term. Linking key terms with images that are meaningful to you will help you remember them and recall them in an exam!
3. This chapter is all about stress as a psychobiological process. To show your understanding of this, colour code each section of the mind map to show which concepts are related to psychological processes and which are related to biological processes.



Review activity 2:

Type the URL [ted.com/talks](https://www.ted.com/talks) into your browser and search for 'Hailey Hardcastle'. Watch the seven-minute video called 'Why students should have mental health days' (Hardcastle, 2020) and answer the following questions (you may write in dot points).

1. 'Our head and our bodies are connected by much more than just our neck after all' (1:35). Using your knowledge of the gut-brain axis, explain this comment.
2. 'Physical and mental health are equal and should be treated as such' (5:26). Using your knowledge of **biological** processes of stress, list everything you learnt in this chapter that supports this claim.
3. Using your knowledge of Lazarus and Folkman's Transactional Model of Stress and Coping, evaluate the proposal that each student should be able to take a mental health day when it suits them. Justify why this is a better policy than simply increasing days off for all students.
4. Using your knowledge of **effective coping**, write some advice for students to manage their stress during a mental health day.

Chapter 3 test

Multiple choice

Question 1 (1 MARK)

In terms of Selye's General Adaptation Syndrome, cortisol levels are sustained to maintain increased arousal in the face of stress during

- A. resistance.
- B. shock.
- C. countershock.
- D. exhaustion.

Question 2 (1 MARK)

An advantage of Lazarus and Folkman's Transactional Model of Stress and Coping is that

- A. it takes into account the subjective nature of the stress response.
- B. it considers both psychological and physiological responses to stress.
- C. it is easy to test through psychological research.
- D. it is easy to align with the role of cortisol in the stress response.

Adapted from VCAA Psychology exam 2 2012 Q32

Question 3 (1 MARK)

Darius just smashed his phone screen, and plans to go straight to his local repair shop to fix it. Darius' phone breaking can be considered as

- A. an internal stressor.
- B. an external stressor.
- C. acute stress.
- D. chronic stress.

Use the following information to answer questions 4 and 5.

Andrea's best friend of 50 years recently died, and she has been struggling to cope. As an elderly woman without many other friends, Andrea has decided to stay in bed and cry alone for a few weeks.

Question 4 (1 MARK)

Andrea staying in bed and crying is an example of

- A. approach coping.
- B. problem-focused coping.
- C. emotion-focused coping.
- D. coping flexibility.

Question 5 (1 MARK)

Given the traumatic nature of the stressor, Andrea could be considered to be demonstrating

- A. coping flexibility.
- B. eustress.
- C. approach coping.
- D. context-specific effectiveness.

Question 6 (1 MARK)

Which of the following statements about the gut-brain axis is incorrect?

- A. The gut-brain axis refers to the communication only from the gut to the brain.
- B. The gut-brain axis involves the enteric and central nervous systems.
- C. The gut-brain axis refers to the bidirectional connection between the gut and the brain.
- D. The gut-brain axis is impacted by gut microbiota.

Short answer**Question 7** (7 MARKS)

Antoni's house was badly flooded six months ago, and since then he has been renting an apartment as the damage is repaired. The repairs have been very expensive, and he is running out of money as he pays for both rent and repairs at the same time. When his house first flooded, Antoni thought about all the possessions he had lost and thought that he would never be able to rebuild his house. Six months on, Antoni believes he will eventually fix his house, and works tirelessly on it each day. Although he gets colds from stress occasionally, he is still able to work on his house each day, and has barely seen his friends for months.

- a. In terms of Lazarus and Folkman's Transactional Model of Stress and Coping, explain how Antoni appraised the stressor six months ago in the primary appraisal stage. (2 MARKS)
- b. In terms of Selye's General Adaptation Syndrome, describe the likely stage Antoni is experiencing six months after the flooding. (2 MARKS)
- c. As Antoni ran out of money, he decided to focus repairs on one room of his house so that he could live in there while the rest of the house's damage was repaired. This meant that he no longer had to spend lots of money on renting a separate apartment. Describe the concept of coping flexibility and explain whether Antoni is demonstrating it in this scenario. (3 MARKS)

Question 8 (4 MARKS)

Using examples, describe the difference between acute and chronic stress responses.

Question 9 (2 MARKS)

When Duyen's father asked how her day was, she told him that she had been experiencing a sore stomach all day. Duyen's father was concerned for her health, but she told him not to worry as she was just stressed about her upcoming exams.

Describe the gut-brain axis and explain what it suggests about Duyen's experience of stress.

Question 10 (3 MARKS)

Ngoza is a year 12 student at Edrolo Secondary College. Last year, whenever she felt stressed, Ngoza would go for a run while listening to her favourite music, which always left her feeling relaxed and refreshed. However, after using this strategy before her last three SACs, Ngoza still felt anxious and stressed.

In terms of coping flexibility, explain Ngoza's experience of stress in year 12.

Question 11 (10 MARKS)

Dr Peppe wanted to investigate the relationship between stress and medically significant gastrointestinal (stomach) problems over time. To do this, she recruited 50 university students, aged 18–25 years, who had recently been seen by campus medical staff for stomach related concerns, but had no serious medical history. Each participant completed a questionnaire that documented the number of stressful experiences they had encountered over the last month. Dr Peppe found that, on average, higher numbers of stressful experiences correlated with higher instances of stomach pains.

Using your knowledge of psychological and physiological processes of stress, write a summary of Dr Peppe's research paper that explains possible causes of her results. Additionally, discuss any limitations of her study and how these should be addressed in future.

Unit 3 AOS 1 review

The VCE study design outlines that, upon completion of this area of study, you must be able to 'analyse how the functioning of the human nervous system enables a person to interact with the external world, and evaluate the different ways in which stress can affect psychobiological functioning.'

SAC assessment 1

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 1-12.

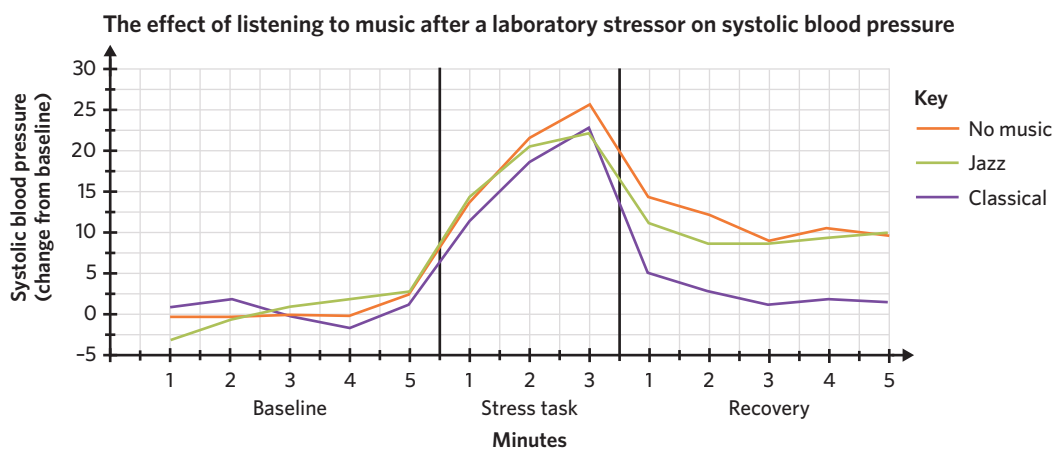
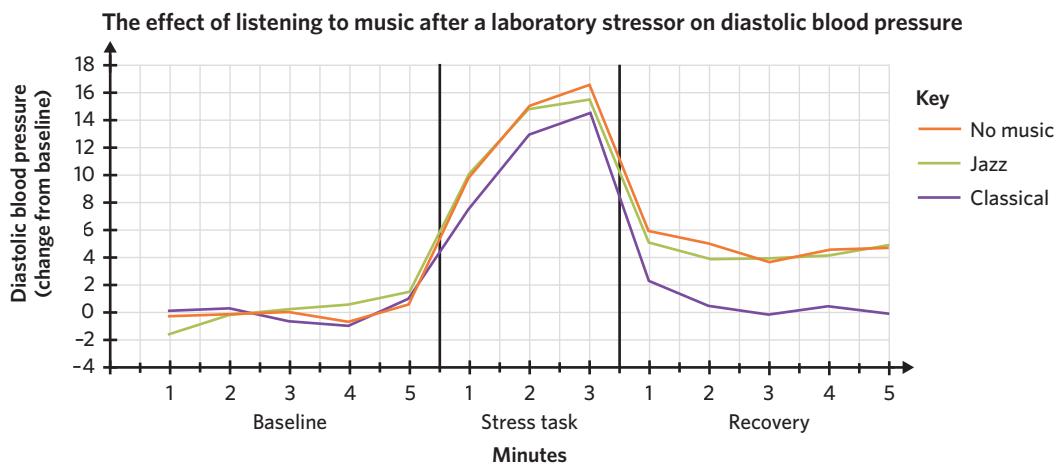
The effects of music on blood pressure after stress exposure

A study was conducted to investigate the effects of listening to music on blood pressure after exposure to stress (completion of a stress task). The blood pressure of participants was recorded before completing the stress task (baseline), during the stress task, and after the stress task (recovery). The stress task involved participants completing three minutes of mental arithmetic while being harassed. This involved participants being instructed to count backwards out loud by 13s, starting from 2,397. The harassment involved the instructor interrupting the participant every 30 seconds to tell them that they were too slow and needed to start again at a faster pace. After the stress task, participants were then required to listen to classical music, jazz music, or no music.

The following graphs present the results.

The first graph presents diastolic blood pressure, which is the pressure in the arteries between heartbeats.

The second graph presents systolic blood pressure, which is the pressure in the arteries while the heart is beating.



(Chafin et al., 2004)

Question 1 (5 MARKS)

- a. Write a potential hypothesis for this experiment. (3 MARKS)
- b. Identify and describe the type of controlled experiment design used in this experiment. (2 MARKS)

Question 2 (3 MARKS)

- a. What type of data has been collected in this experiment? (1 MARK)
- b. Why is blood pressure an appropriate measure to use in this experiment? (1 MARK)
- c. Are changes in blood pressure a conscious or unconscious response? (1 MARK)

Question 3 (3 MARKS)

- a. What division of the nervous system is being measured in this experiment? (1 MARK)
- b. When participants were undergoing the stress task, describe the likely activity of the division of the nervous system identified in **part a**. (2 MARKS)

Question 4 (3 MARKS)

Describe the results found in the graphs and suggest what this may mean for managing stress levels through listening to music.

Question 5 (9 MARKS)

- a. Would the stress task be considered an internal or external stressor? Justify your response. (2 MARKS)
- b. Compare acute and chronic stress and identify which type of stress was likely to be experienced by the participants. (3 MARKS)
- c. Suggest another biological way the participant's levels of stress could be measured in this study. (2 MARKS)
- d. With reference to context-specific effectiveness, outline whether listening to classical music would be an effective coping strategy in all stressful situations. (2 MARKS)

Question 6 (2 MARKS)

Consider the following information about a potential participant.

When participant 1 was required to complete the stress task they were unable to do so and sat motionless in silence for the amount of time. Participant 1's blood pressure was high during this time.

With reference to the flight-or-fight-or-freeze response, describe which response participant 1 was likely to be experiencing when they were unable to complete the task.

Question 7 (3 MARKS)

- a. Describe Selye's General Adaptation Syndrome (GAS). (1 MARK)
- b. What stage of the GAS model were the participants likely to be in when they first found out they were required to complete the three-minute mental arithmetic task? Justify your response. (2 MARKS)

Question 8 (2 MARKS)

For all participants, what may have happened to their levels of adrenaline when they were undergoing the stress task? Justify your response.

Question 9 (2 MARKS)

Consider the following information about a potential participant.

Participant 4 has not completed any maths since school, which was many years ago. When participant 4 was required to complete the mental arithmetic task, they had great difficulty answering the questions.

Explain why participant 4 had great difficulty answering the questions, with reference to long-term depression.

Question 10 (3 MARKS)

With reference to the results from the experiment, suggest whether an individual listening to classical music after stress exposure would experience decreased perspiration compared to an individual who does not listen to music after stress exposure.

Question 11 (3 MARKS)

In relation to the Lazarus and Folkman's Transactional Model of Stress and Coping, does this study suggest that listening to music can change a person's appraisal of the stressor? Justify your response.

Question 12 (2 MARKS)

Identify one piece of information that the results provide evidence for about stress and music and describe how it can be applied to the real world.

Unit 3 AOS 1 review

SAC assessment 2

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 1–6.

Media text 1

Faecal transplants: A potential treatment for mental health problems

According to new research, poo could become an uncanny treatment option for mental health disorders. Specifically, when ingested, the microbes in another person's faeces may have the power to change the gut microbiome and impact the brain, improving mental health.

There is promising evidence for the link between unhealthy gut microbiomes and mental health disorders, including bipolar disorder and major depressive disorder. Faecal transplants, in which the poo of healthy donors is transferred to the patient, could possibly alleviate the symptoms of these conditions by replacing the unhealthy microbes with healthy microbes.

Jane, who suffers from bipolar disorder, experienced drastic improvements in her symptoms after receiving faecal transplants in 2016. Jane went from being 'completely disabled' and experiencing an 'unbelievable' level of suffering to being a 'fully functional adult'.

While treating mental health disorders using poo microbes is an extremely new area of research, faecal transplants may become an approved clinical treatment for psychiatric conditions in the near future.

(De George, 2022)

Media text 2

Individual experiences of using antidepressants

Antidepressants are a common treatment method for depressive disorders, with approximately 7.3 million adults in England using antidepressants. There are various forms of antidepressant medication. All forms help to balance levels of serotonin, or the 'happy hormone', in the brain. Some forms also target norepinephrine, which is a neurochemical that modulates anxiety and stress responses.

The use of antidepressants to treat depressive disorders is a controversial topic that has received much scrutiny. Some people question the effectiveness of antidepressants and believe that antidepressant medications are overprescribed. Are antidepressants of benefit to people suffering from mental health disorders? Or is the criticism warranted?

The true impact of antidepressants is revealed by the testimonials of people whose lives have been transformed thanks to these medications. John, who was on a 'downwards spiral' after 'struggling for years' when he was prescribed antidepressants, claims that his medication 'saved [his] life'. Antidepressants enabled his mental health to 'improve to a level [he] never thought possible'.

For Rachel, her severe depression left her 'numb' with 'no desire to do anything'. She claims that using antidepressants drastically improved her mental health. '[Antidepressants] don't change who you are... or take away your spark', Rachel says, 'they gave mine back to me'.

(Colombo, 2022)

Question 1 (7 MARKS)

According to Media text 1, there is 'promising evidence for the link between unhealthy gut microbiomes and mental health disorders'.

- a. Describe the gut-brain axis. (2 MARKS)
- b. Explain how faecal transplants provide evidence for the gut-brain axis. (2 MARKS)
- c. Describe how other emerging research provides evidence for the gut-brain axis. (3 MARKS)

Question 2 (9 MARKS)

According to Media text 2, all forms of antidepressant medications help to balance serotonin levels in the brain.

- a. Identify and describe the type of neurochemical that serotonin is. (2 MARKS)
- b. Explain why antidepressant medication would target serotonin, with reference to the role of serotonin in functioning. (2 MARKS)
- c.
 - i. Outline what a neural synapse is. (1 MARK)
 - ii. Describe the process by which serotonin is successfully transmitted across a neural synapse. (3 MARKS)
 - iii. Before John and Rachel started taking antidepressant medications, was serotonin being successfully transmitted across neural synapses in their brains? (1 MARK)

Question 3 (5 MARKS)

According to Media text 2, norepinephrine is a neurochemical in some antidepressant medications that 'modulates anxiety and stress responses'.

- a. Identify another neurochemical that regulates anxiety and explain how it does this. (2 MARKS)
- b.
 - i. Outline two physiological responses that may occur during a stress response. (2 MARKS)
 - ii. Identify the division of the nervous system that is responsible for the physiological responses identified in **part b.i.** (1 MARK)

Question 4 (3 MARKS)

Describe how Rachel's nervous system could coordinate the conscious response of taking an antidepressant tablet.

Question 5 (6 MARKS)

Living with a mental health problem can be considered a stressor that Jane, John, and Rachel experience.

- a. Before being prescribed antidepressants, is John's experience of a mental health problem an example of chronic stress or acute stress? Justify your response. (2 MARKS)
- b. Is the coping strategy Rachel uses an example of an approach strategy or an avoidance strategy? Justify your response. (2 MARKS)
- c. According to Lazarus and Folkman's transactional model of stress and coping, what is the likely secondary appraisal Jane would have to the stressor of living with a mental health problem after receiving faecal transplants? Justify your response. (2 MARKS)

Question 6 (10 MARKS)

A researcher designs an investigation to test the effects of antidepressant medication and faecal transplants on depressive symptoms, in comparison to receiving no treatment, among people with depression. The researcher decides to use a within-subjects controlled experiment design.

- a. Identify the independent and dependent variables of this investigation. (2 MARKS)
- b.
 - i. Outline what is meant by a within-subjects controlled experiment design. (1 MARK)
 - ii. Outline a possible limitation of this controlled experiment design and explain how it may be overcome. (2 MARKS)
- c. Identify an ethical consideration and outline how it may be upheld in this investigation. (2 MARKS)
- d. Suggest how the dependent variable could be measured. (1 MARK)
- e. Describe the likely results of the research investigation. (2 MARKS)

UNIT 3 AOS 2

How do people learn and remember?

Learning and memory are interdependent processes that demonstrate the acquisition of skills and knowledge through experience across the life span. In this area of study students evaluate models to explain learning and apply their knowledge of learning to a range of everyday experiences and contemporary social issues.

Students explore memory as the process by which knowledge is encoded, stored and later retrieved, as illustrated by Richard Atkinson and Richard Shiffrin's multi-store model of memory, including how information passes through distinct memory stores in order for it to be stored relatively permanently. Students explore the interconnectedness of brain regions in storing explicit and implicit memories and the role of semantic and episodic memory in cognition. They consider the use of mnemonics to increase the encoding, storage and retrieval of information and develop an understanding of the contribution of Aboriginal and Torres Strait Islander knowledges and perspectives in understanding memory and learning.

Outcome 2

On completion of this unit the student should be able to apply different approaches to explain learning to familiar and novel contexts and discuss memory as a psychobiological process.

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4



CHAPTER 4

Approaches to understanding learning

LESSONS

- 4A Classical conditioning
- 4B Operant conditioning
- 4C Observational learning
- 4D Aboriginal and Torres Strait Islander approaches to learning

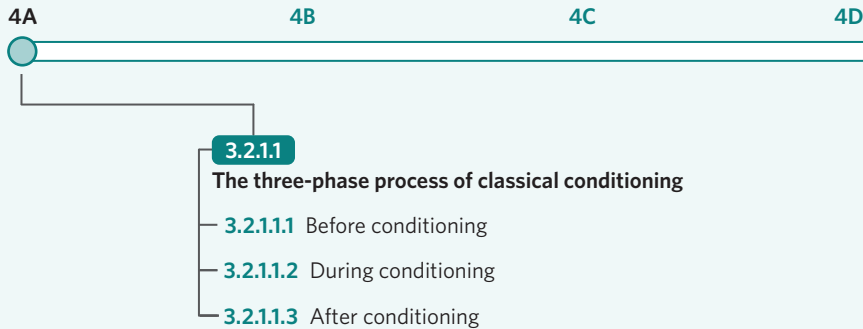
KEY KNOWLEDGE

- behaviourist approaches to learning, as illustrated by classical conditioning as a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response, and operant conditioning as a three-phase process (antecedent, behaviour and consequence) involving reinforcement (positive and negative) and punishment (positive and negative)
- social-cognitive approaches to learning, as illustrated by observational learning as a process involving attention, retention, reproduction, motivation and reinforcement
- approaches to learning that situate the learner within a system, as illustrated by Aboriginal and Torres Strait Islander ways of knowing where learning is viewed as being embedded in relationships where the learner is part of a multimodal system of knowledge patterned on Country

4A Classical conditioning

STUDY DESIGN DOT POINT

- behaviourist approaches to learning, as illustrated by classical conditioning as a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response, and operant conditioning as a three-phase process (antecedent, behaviour and consequence) involving reinforcement (positive and negative) and punishment (positive and negative)



Over the course of your life you have learnt many behaviours and lots of information. You're probably hoping to learn even more information by reading this lesson. But what you're less likely to have consciously thought about is the process of learning itself. In this lesson, you will learn about the three-phase process of classical conditioning.

The three-phase process of classical conditioning 3.2.1.1

Classical conditioning is one of the most historically significant behaviourist approaches to learning, which demonstrates that learning can occur involuntarily as a result of the pairing of different stimuli.

Theory details

Broadly speaking, **learning** is the process of acquiring knowledge, skills, or behaviours through experience. Over time, there have been many different approaches and theories about the process of learning. For example, **behaviourist approaches to learning** are theories that propose learning occurs by interacting with the external environment. They focus on behaviours that can be directly observed and recorded.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Learning the process of acquiring knowledge, skills, or behaviours through experience

Behaviourist approaches to learning theories that propose learning occurs by interacting with the external environment

WANT TO KNOW MORE?

Behaviourist approaches to learning emerged historically as part of a broader effort to transform psychology into an empirical science that was similar to other scientific disciplines. The logic of early behaviourist research was that psychological theories should be supported by empirical data, which would ensure that these theories could be tested and observed in the real world. Classical conditioning is a behaviourist approach to learning that emerged as part of these efforts.

Classical conditioning is a process of learning through the involuntary association between a neutral stimulus and an unconditioned stimulus that results in a conditioned response. It involves three stages:

1. before conditioning
2. during conditioning
3. after conditioning.

Classical conditioning is a form of involuntary learning whereby the subject can be conditioned without making any conscious effort to learn the conditioned response. Ivan Pavlov conducted formative classical conditioning experiments on dogs during the 1890s. During these experiments, Pavlov classically conditioned dogs to salivate in response to the sound of a bell, which was repeatedly paired with the presentation of food (Pavlov, 1927). This example will be used throughout this lesson given Pavlov's historical influence on the establishment of classical conditioning as a behaviourist approach to learning.

Before conditioning 3.2.1.1

Before conditioning is the first stage of classical conditioning, during which the neutral stimulus has no associations and therefore does not produce any significant response.

This first stage of classical conditioning involves the:

- **neutral stimulus**, which is the stimulus that produces no significant response prior to conditioning.
- **unconditioned stimulus**, which is the stimulus that produces an unconscious response.
- **unconditioned response**, which is a naturally occurring behaviour in response to a stimulus.

Before conditioning represents the natural condition that comes before any learned response. At this stage, there is no conditioned stimulus or conditioned response. Instead, there is only a neutral stimulus that produces no significant response, as well as an unconditioned stimulus that automatically produces an unconditioned response.

In Pavlov's experiments, the neutral stimulus was the sound of the bell. Before conditioning occurred, the dogs displayed no significant response to the sound of a bell. By contrast, the unconditioned stimulus was the presentation of food, which automatically produced the unconscious response of salivation.

Figure 1 illustrates the stimuli and responses that occur during the before conditioning stage of classical conditioning.

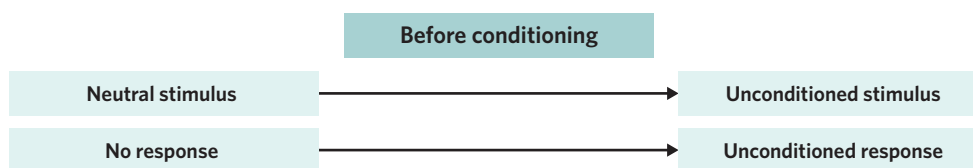


Figure 1 The before conditioning stage of classical conditioning

USEFUL TIP

You are often required to write out each of the different classical conditioning stimulus types and responses several times in an exam response. For this reason, you can abbreviate the different stimuli and responses as follows:

- Neutral stimulus (NS)
- Unconditioned stimulus (UCS)
- Unconditioned response (UCR)
- Conditioned stimulus (CS)
- Conditioned response (CR).

Importantly, you need to write out each stimulus type and response in full the first time it comes up in your response, followed by the abbreviation in brackets. After this, you can use the abbreviated form of the terms each time.

Classical conditioning

a process of learning through the involuntary association between a neutral stimulus and an unconditioned stimulus that results in a conditioned response

Before conditioning

the first stage of classical conditioning, during which the neutral stimulus has no associations and therefore does not produce any significant response

Neutral stimulus

the stimulus that produces no significant response prior to conditioning

Unconditioned stimulus

the stimulus that produces an unconscious response

Unconditioned response

a naturally occurring behaviour in response to a stimulus

During conditioning the second stage of classical conditioning, during which the neutral stimulus is repeatedly paired with the unconditioned stimulus, producing the unconditioned response

After conditioning the third stage of classical conditioning, during which the neutral stimulus becomes the conditioned stimulus, producing a conditioned response

Conditioned stimulus the stimulus (originally the neutral stimulus) that produces a conditioned response after being repeatedly paired with an unconditioned stimulus

Conditioned response the response that occurs involuntarily after the conditioned stimulus is presented

During conditioning 3.2.1.1.2

During conditioning is the second stage of classical conditioning, during which the neutral stimulus is repeatedly paired with the unconditioned stimulus, producing the unconditioned response. During this stage, the neutral stimulus (NS) is repeatedly paired with the unconditioned stimulus (UCS), which in turn produces the unconditioned response (UCR). The timing and order of presenting the neutral and unconditioned stimuli are important. The neutral stimulus must be presented first, remaining until the unconditioned stimulus is presented within half a second. The unconditioned stimulus should not be presented any later than this.

In Pavlov's experiments, this involved the repeated presentation of the sound of the bell (NS) with the dog's food (UCS), which in turn produced the UCR of salivation. The bell was sounded first, and then the food was presented directly afterwards.

To summarise the during conditioning stage:

- the NS is repeatedly paired with the UCS, which in turn produces the UCR.
- the NS is to be presented half of a second before the UCS.

Figure 2 illustrates the during conditioning stage.

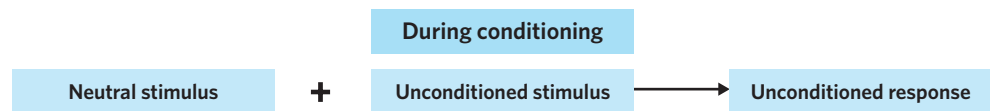


Figure 2 The during conditioning stage of classical conditioning

After conditioning 3.2.1.1.3

After conditioning is the third stage of classical conditioning, during which the neutral stimulus becomes the conditioned stimulus, producing a conditioned response. This is the final stage of classical conditioning. By this point, the conditioned response has been learnt. The neutral stimulus is now referred to as the conditioned stimulus, and its presentation alone will produce a conditioned response, which will be similar to the original unconditioned response.

The after conditioning stage of classical conditioning involves the:

- **conditioned stimulus**, which is the stimulus (originally the neutral stimulus) that produces a conditioned response after being repeatedly paired with an unconditioned stimulus.
- **conditioned response**, which is the response that occurs involuntarily after the conditioned stimulus is presented.

In Pavlov's experiment, the sound of the bell ultimately became the conditioned stimulus after conditioning had occurred. The sound of the bell alone made the dogs salivate. The dogs salivating in response to the sound of the bell was the conditioned response and final outcome of Pavlov's experiments.

USEFUL TIP

In classical conditioning, the conditioned and unconditioned responses involve the same kind of behaviour. For example, the unconditioned response in Pavlov's experiment was salivation in response to the presentation of food, while the conditioned response was the dog's salivation in response to the sound of the bell. In order to demonstrate your understanding of the difference between these two responses, it is therefore necessary that you state what stimulus is producing the behaviour. To make sure you have covered this, use the phrase 'in response to' while describing the behaviour.

Figure 3 illustrates the after conditioning stage.

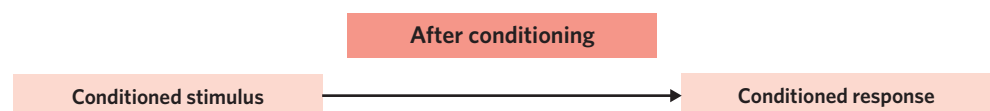


Figure 3 The after conditioning stage of classical conditioning

We can now put together all of the different stages of classical conditioning. Classical conditioning as a three-phase process is illustrated in figure 4, with reference to Pavlov's experiments.

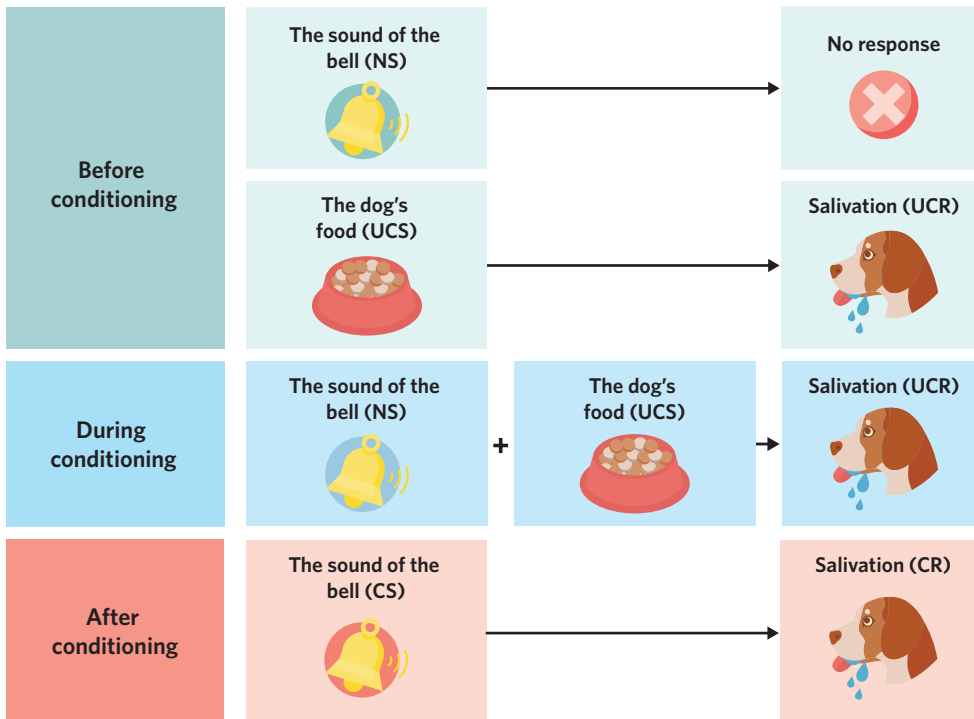


Figure 4 Pavlov's classical conditioning experiments

LESSON LINK

In lesson **2D Synaptic plasticity**, you learnt about synaptic plasticity as the fundamental mechanism of learning and memory. When you learn a new behaviour or response through classical conditioning, the neural synapses physically change in response to this conditioning. For example, during conditioning, when the NS is repeatedly paired with the UCS to produce the UCR, this repeated pairing can lead to long-term potentiation and strengthen the neural pathway representing this new learning. In this way, learning that occurs through classical conditioning is physically represented by changes in the brain.

WANT TO KNOW MORE?

John Watson and Rosalie Rayner conducted another historical classical conditioning experiment that is popularly known as the 'Little Albert' experiment. This experiment is significant as it demonstrated that an emotional response, fear in this case, could be learnt through the process of classical conditioning. During this experiment, Watson and Rayner classically conditioned a nine-month-old boy, referred to as 'Little Albert,' to elicit a fear response when presented with a white rat. They achieved this by repeatedly presenting a white rat (neutral stimulus) with the startling noise of a hammer being hit against a steel bar behind Little Albert's head (the unconditioned stimulus). This, in turn, produced an unconditioned fear response in the form of Little Albert crying. Ultimately, the white rat became a conditioned stimulus that would make Little Albert cry when presented alone.

Interestingly, the 'Little Albert' experiment also revealed other interesting phenomena associated with classical conditioning:

1. This experiment demonstrated the concept of stimulus generalisation, which occurs when the classically conditioned subject elicits the same conditioned response to similar objects. This was evident as Little Albert would display the same conditioned fear response of crying when presented with other stimuli similar to the original conditioned stimulus of the white rat. For example, Little Albert elicited the fear response and cried when presented with a rabbit, a seal fur coat, cotton wool, and a Santa Claus mask.
2. Little Albert also demonstrated the concept of stimulus discrimination. This occurs when the classically conditioned subject learns to distinguish the conditioned stimulus from other otherwise related stimuli. This was evident in this experiment as Little Albert could distinguish the conditioned stimulus of the white rat from some other related stimuli. For example, when presented with a dog, Little Albert did not show the conditioned fear response of crying.
3. There is one final classical conditioning phenomenon: extinction of the conditioned response. This occurs when the conditioned stimulus is repeatedly presented without the unconditioned stimulus. The association between the conditioned and unconditioned stimuli eventually weakens when this occurs, until eventually the conditioned stimulus no longer produces any conditioned response. It is also possible that the conditioned response returns in a weaker form after extinction has occurred, which is referred to as spontaneous recovery.

Although you do not need to learn these classical conditioning concepts, the Little Albert experiment remains a historic and instructive example of classical conditioning to consider.

(Watson & Rayner, 1920)

Theory summary

In this lesson, you learnt about classical conditioning as a behaviourist approach to learning. This involved learning about the three phases of classical conditioning: before conditioning, during conditioning, and after conditioning. The three phases of classical conditioning are summarised in figure 5, along with the corresponding stimuli and responses associated with each stage.

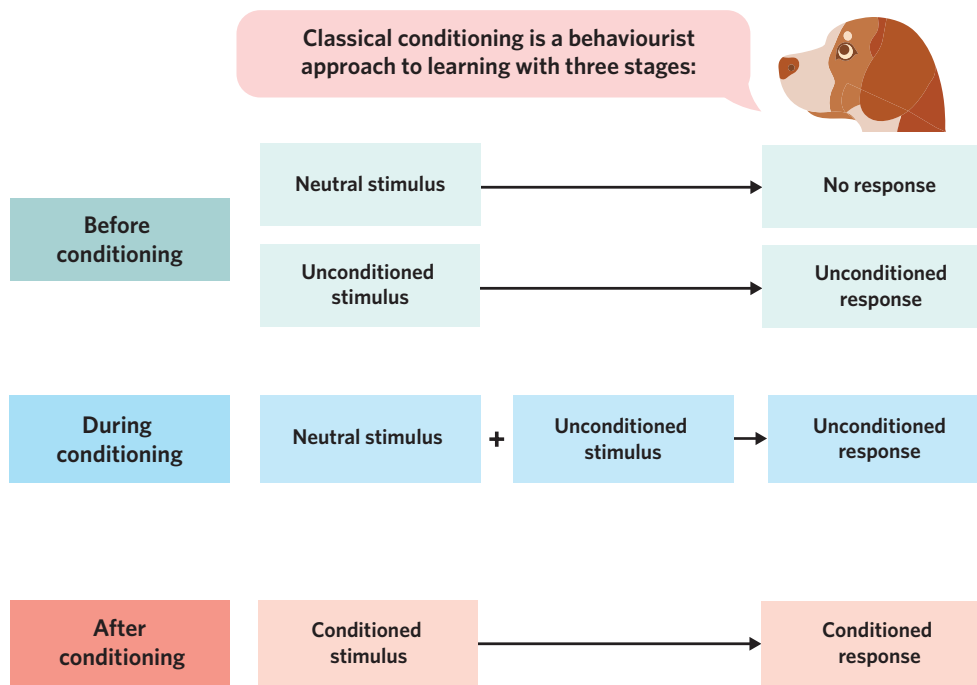


Figure 5 Summary of classical conditioning as a three-phase process

4A Questions

Theory review

Question 1

Classical conditioning is a

- behaviourist approach to learning.
- biological approach to learning.
- conscious approach to learning.

Question 2

The three phases of classical conditioning are before conditioning, _____, and after conditioning.

Which of the following best fills in the blank?

- conditioning
- during conditioning

Question 3

What does classical conditioning result in? (Select all that apply)

- A voluntary association between two stimuli.
- An involuntary association between two stimuli.
- An association between a neutral stimulus and an unconditioned stimulus.
- A conditioned response.

Question 4

The neutral stimulus produces an unconditioned response during the before conditioning phase of classical conditioning.

- A. True.
- B. False.

Question 5

The neutral stimulus becomes the conditioned stimulus in the _____ phase of classical conditioning.

Which of the following best fills in the blank?

- A. during conditioning
- B. after conditioning

Question 6

What stimulus is repeatedly paired with the unconditioned stimulus in the during conditioning phase of classical conditioning?

- A. Conditioned stimulus.
- B. Neutral stimulus.

Assessment skills

Perfect your phrasing

Question 7

Which of the following sentences is most correct?

- A. Classical conditioning results in the **involuntary** association between a neutral stimulus and an unconditioned stimulus to produce a conditioned response.
- B. Classical conditioning results in the **automatic** association between a neutral stimulus and an unconditioned stimulus to produce a conditioned response.

Question 8

Which of the following sentences is most correct?

- A. The first phase of classical conditioning is **pre-conditioning**, at which point the neutral stimulus produces no significant response.
- B. The first phase of classical conditioning is **before conditioning**, at which point the neutral stimulus produces no significant response.

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 9 and 10.

Przemysław Bąbel (2019) argues that classical conditioning has been used historically to facilitate placebo effects. Through classical conditioning, a stimulus that has no active properties can become associated with an active drug. Within this perspective, the inactive stimulus is the neutral stimulus, which is repeatedly associated with the unconditioned stimulus of an active drug. After conditioning, the inactive stimulus becomes the conditioned stimulus and will have similar effects as the original, active drug. For example, pharmaceutical companies will produce pills with a very specific colour based on marketing research. For individuals taking these medications, the colour itself becomes part of the medicinal effects – they begin to feel better simply when seeing the colour.

Question 9

Using the language of classical conditioning, what type of stimulus is the placebo?

- A. Neutral stimulus.
- B. Conditioned stimulus.
- C. Unconditioned stimulus.
- D. Pre-conditioned stimulus.

Question 10

Which of the following examples could constitute a classically conditioned placebo effect?

- A. Taking paracetamol to alleviate a headache.
- B. Drinking water to alleviate a headache.
- C. Alleviating a headache by repeatedly drinking blue-coloured water when taking paracetamol.
- D. Alleviating a headache by drinking blue-coloured water by itself, after drinking blue coloured water is repeatedly paired with taking paracetamol to alleviate headaches.

Exam style**Remember and understand****Question 11** (1 MARK)

Which of the following is a difference between the during and after conditioning phases of classical conditioning?

| | During conditioning | After conditioning |
|----|--|--|
| A. | The neutral stimulus is paired with the unconditioned stimulus to produce an unconditioned response. | The neutral stimulus produces no significant response. |
| B. | The neutral stimulus produces no significant response. | The neutral stimulus is paired with the unconditioned stimulus to produce an unconditioned response. |
| C. | The neutral stimulus is paired with the unconditioned stimulus to produce an unconditioned response. | The conditioned stimulus produces the conditioned response. |
| D. | The conditioned stimulus produces the conditioned response. | The neutral stimulus is paired with the unconditioned stimulus to produce an unconditioned response. |

Adapted from VCAA Psychology exam 2021 Q10

Question 12 (1 MARK)

During conditioning, the neutral stimulus should be presented and remain until

- A. the unconditioned stimulus is presented about five seconds later.
- B. the unconditioned stimulus is presented about half a second later.
- C. the conditioned stimulus is presented about five seconds later.
- D. until the conditioned stimulus is presented about half a second later.

Adapted from VCAA Psychology exam 2013 Q28

Question 13 (2 MARKS)

Describe the difference between the neutral and unconditioned stimuli during classical conditioning.

Question 14 (3 MARKS)

Describe classical conditioning as a three-phase process of learning.

Apply and analyse

Use the following information to answer questions 15–17.

Bernard was about to sit on a bench at the beach when he noticed that he felt happy and had been unconsciously smiling. He realised that this feeling was probably associated with his girlfriend, whom he often brings to this bench to watch the sunset.

Reproduced from VCAA Psychology exam 2020 Q13

Question 15 (1 MARK)

During the process of conditioning Bernard's response, the

- A. unconditioned response is the sunset.
- B. conditioned stimulus is sitting on the bench at the beach.
- C. neutral stimulus is his girlfriend.
- D. conditioned stimulus is his girlfriend.

Adapted from VCAA Psychology exam 2020 Q13

Question 16 (1 MARK)

During the before conditioning phase, the

- A. unconditioned stimulus of seeing the sunrise produces the unconditioned response of unconsciously smiling.
- B. neutral stimulus is Bernard's girlfriend, producing no significant response.
- C. neutral stimulus of sitting on the bench at the beach would produce no significant response.
- D. conditioned stimulus of sitting on the bench at the beach produces the conditioned response of feeling happy and unconsciously smiling.

Question 17 (1 MARK)

In the during conditioning phase, Bernard

- A. sitting on the bench at the beach is repeatedly paired with being with his girlfriend.
- B. seeing the sunset is repeatedly paired with being with his girlfriend.
- C. being at the beach is repeatedly paired with being with his girlfriend.
- D. sitting on the bench at the beach is repeatedly paired with seeing the sunset.

Question 18 (3 MARKS)

Millie's dog Dudley wakes up excited every morning, wagging his tail as he anticipates his morning walk. Before taking Dudley for a walk, Millie always takes her jacket off a coat hanger by the front door and then proceeds to put a lead on Dudley and take him out for a walk. Now Dudley gets excited and wags his tail whenever Millie takes her jacket off the coat hanger at any point during the day.

Using the language of classical conditioning, outline the three-phase process of how Dudley learnt to get excited and wag his tail.

Adapted from VCAA Psychology exam 2021 Q2ci

Questions from multiple lessons

Question 19 (4 MARKS)

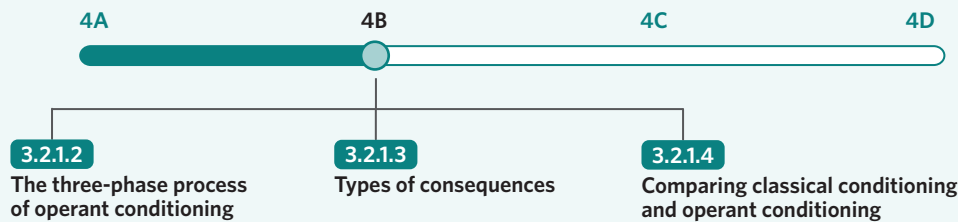
Samia works as a chef at her local restaurant. The kitchen at Samia's workplace gets incredibly hot from all the cooking, causing her to sweat when she is working. Samia always puts on her apron directly before entering the kitchen and beginning her shift because it is uncomfortable. Recently, she needed to replace her apron and found that she started sweating when trying on a new apron at a cookware store.

- a. Identify the division of Samia's nervous system that is dominant when she starts to sweat at the cookware store. (1 MARK)
- b. Describe how classical conditioning as a three-phase model could explain why Samia started sweating when trying on a new apron. (3 MARKS)

4B Operant conditioning

STUDY DESIGN DOT POINT

- behaviourist approaches to learning, as illustrated by classical conditioning as a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response, and operant conditioning as a three-phase process (antecedent, behaviour and consequence) involving reinforcement (positive and negative) and punishment (positive and negative)



In the previous lesson, you learnt about classical conditioning as a behaviourist approach to learning. However, there is more than just one behaviourist approach to learning. You may have wondered how you consciously learn new information in your everyday life, which represents a different kind of learning to the more passive approach of classical conditioning. In this lesson, you will learn about operant conditioning, which is a behaviourist approach to learning whereby a consequence determines the likelihood that a particular behaviour will be repeated in the future.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Operant conditioning a three-phase learning process that involves an antecedent, behaviour, and consequence, whereby the consequence of a behaviour determines the likelihood that it will reoccur

The three-phase process of operant conditioning 3.2.1.2

Operant conditioning is a behaviourist approach to learning. In this section of the lesson, you will learn about the development of operant conditioning within the field of behavioural psychology, as well as its three phases.

Theory details

Operant conditioning is a three-phase learning process that involves an antecedent, behaviour, and consequence, whereby the consequence of a behaviour determines the likelihood that it will reoccur. Like classical conditioning, operant conditioning is an example of a behaviourist approach to learning.

WANT TO KNOW MORE?

Operant conditioning was developed after classical conditioning in the field of behavioural psychology. It was developed in the 1930s by B.F. Skinner, who created a device called the operant chamber (popularly known as the 'Skinner box'). This device ensured that test animals, such as rats and pigeons, were not exposed to the external environment, and could instead be controlled by the experimenter alone. Skinner found that the consequences of an animal's behaviour (such as an electric shock or food) would influence the likelihood that the behaviour would be repeated. Figure 1 presents an example of an operant chamber.

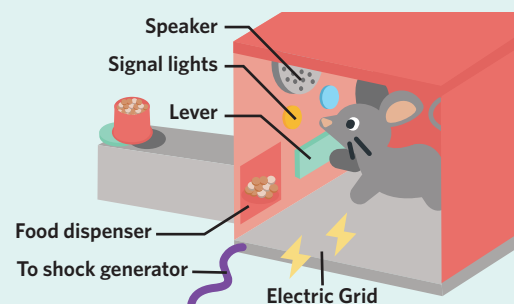


Figure 1 An example of an operant chamber

Operant conditioning suggests that learning occurs through interacting with the external environment, which is why it constitutes a behaviourist approach to learning. From the perspective of operant conditioning, behaviour is not so much influenced by our thoughts, feelings, or emotions, but rather by direct and observable environmental consequences for behaviour.

Operant conditioning has three phases:

1. antecedent
2. behaviour
3. consequence.

The three phases of operant conditioning are described in table 1. Operant conditioning, like classical conditioning, involves progressing from one phase to another chronologically. For this reason, a common example will be used throughout this table to demonstrate the distinction between each phase of operant conditioning. Without completing all three phases of operant conditioning, learning will likely not occur. The example that will be used throughout is one of the most common examples of operant conditioning in practice: teaching a dog how to sit with dog treats.

Table 1 The three phases of operant conditioning

| Phase of operant conditioning | Definition | Example |
|-------------------------------|---|--|
| Antecedent | The stimulus or event that precedes and often elicits a particular behaviour. | The owner says the command word 'sit' to their dog. |
| Behaviour | The voluntary actions that occur in the presence of the antecedent. | The dog sits in response to the command word 'sit'. |
| Consequence | The outcome of the behaviour, which determines the likelihood that it will occur again. | The owner gives the dog a treat after they sit upon command. This increases the likelihood that the dog will sit on command again in the future. |

In the above example, the consequence increased the likelihood that the dog would sit again in the future. This is one of the functions of consequences; however, consequences can also have the opposite effect, decreasing the likelihood that a behaviour is repeated. Let's now examine the different types of consequences and their corresponding influence on learning within the framework of operant conditioning.

Types of consequences 3.2.1.3

We are constantly experiencing consequences for our behaviour in everyday life. There are many different examples of consequences with which you may be familiar: you may have been told off by parents, received a high mark on a test at school, or been complimented by a friend. In this section of the lesson, you will learn about the different types of consequences and their corresponding influence on behaviour and learning.

Theory details

As discussed, a consequence in operant conditioning is simply an outcome of behaviour, which determines the likelihood that the behaviour will occur again in the future. To many people, the term 'consequence' generally signifies being punished. However, 'consequence' takes on a broader meaning when used in the context of operant conditioning. There are two distinct types of consequences in operant conditioning: reinforcement and punishment.

Reinforcement refers to a consequence that increases the likelihood of a behaviour reoccurring. This can occur in two ways:

- **Positive reinforcement**, or the addition of a desirable stimulus, which in turn increases the likelihood of a behaviour reoccurring.
- **Negative reinforcement**, or the removal of an undesirable stimulus, which in turn increases the likelihood of a behaviour reoccurring.

USEFUL TIP

To help you remember the order of the three phases of operant conditioning, you can remember the 'ABCs of operant conditioning', because the first letter of each phase follows the beginning of the alphabet: **A**ntecedent, **B**ehaviour, and **C**onsequence.

Antecedent the stimulus or event that precedes and often elicits a particular behaviour
Behaviour (in relation to operant conditioning) the voluntary actions that occur in the presence of the antecedent
Consequence the outcome of the behaviour, which determines the likelihood that it will occur again

Reinforcement a consequence that increases the likelihood of a behaviour reoccurring
Positive reinforcement the addition of a desirable stimulus, which in turn increases the likelihood of a behaviour reoccurring
Negative reinforcement the removal of an undesirable stimulus, which in turn increases the likelihood of a behaviour reoccurring

Punishment

a consequence that decreases the likelihood of a behaviour reoccurring

Positive punishment

the addition of an undesirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring

Negative punishment (also known as response cost) the removal of a desirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring

By contrast, **punishment** refers to a consequence that decreases the likelihood of a behaviour reoccurring. This can also occur in two ways:

- **Positive punishment**, or the addition of an undesirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring
- **Negative punishment**, or the removal of a desirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring.

As seen above, both reinforcement and punishment are qualified (further described) with either the term ‘positive’ or ‘negative.’ Once again, these terms take on a different meaning when used in the context of operant conditioning. Importantly, they do not judge how ‘good’ or ‘bad’ they are for learning. Instead, they signify presence and absence:

- If a consequence is positive, it means that a stimulus has been added.
- By contrast, if a consequence is negative, it means that a stimulus has been removed.

The language of operant conditioning therefore has its own specific usage and meaning. The different types of consequences are illustrated in figure 2, and described in detail with an example in table 2.

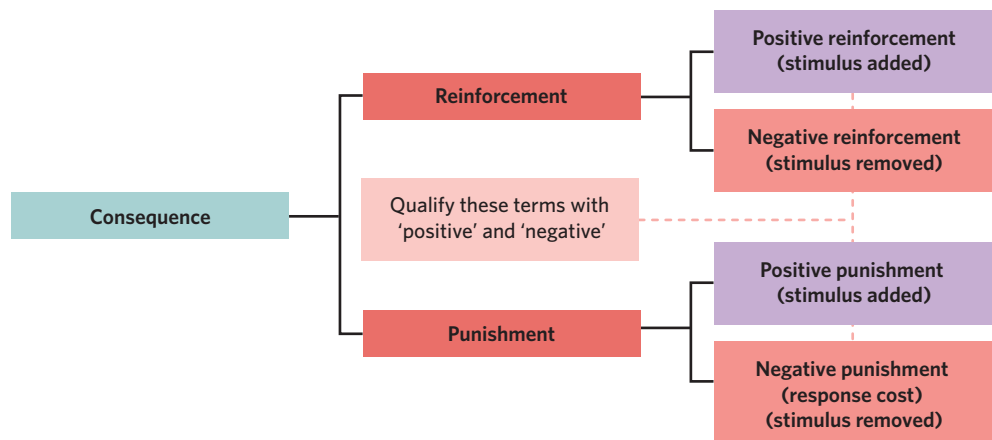


Figure 2 The four types of consequences

Table 2 Types of consequences in operant conditioning

| | Positive | Negative |
|---------------|--|--|
| Reinforcement | <ul style="list-style-type: none"> • Presenting a desired stimulus • For example, this could involve studying hard for a test and then receiving a high mark. Receiving the high mark acts as positive reinforcement for the behaviour of studying hard for school assessments, which increases the likelihood that the behaviour (studying hard) will reoccur. | <ul style="list-style-type: none"> • Removing an undesirable stimulus • For example, this could involve going for a run when you are stressed, which in turn helps to alleviate your feelings of stress. The removal of the undesirable experience of tension and discomfort acts as negative reinforcement for the behaviour of going for a run when you are stressed which increases the likelihood that the behaviour (going for a run) will reoccur. |
| Punishment | <ul style="list-style-type: none"> • Addition of an undesirable stimulus • For example, this could involve a friend criticising you for arriving late to a catch-up. The addition of your friend’s negative remarks acts as positive punishment for the behaviour of arriving late to a social catch-up, decreasing the likelihood that the behaviour (being late) will reoccur. | <ul style="list-style-type: none"> • Removing a desirable stimulus • For example, this could involve not being allowed to go to a party for bad behaviour at home. The removal of the desirable experience of going to a party acts as negative punishment for the bad behaviour at home. This decreases the likelihood that the behaviour (bad behaviour at home) will reoccur. |

Table 3 presents a summary of the different kinds of consequences in operant conditioning and their corresponding effect on behaviour.

Table 3 A summary of the types of consequences in operant conditioning

| | Add or remove stimulus | Increase or decrease behaviour |
|-------------------------------------|------------------------|--------------------------------|
| Positive reinforcement | Add | Increase |
| Negative reinforcement | Remove | Increase |
| Positive punishment | Add | Decrease |
| Negative punishment (response cost) | Remove | Decrease |

Comparing classical conditioning and operant conditioning 3.2.1.4

There are many similarities and differences between classical and operant conditioning. Comparing classical and operant conditioning will deepen your understanding of both learning approaches.

Theory details

Some similarities and differences between classical and operant conditioning have already been revealed in this lesson: both are behaviourist approaches to learning, although the learner is passive during classical conditioning (as they do not consciously decide to engage in the learned behaviour) and active during operant conditioning (as the behaviour is consciously changed or maintained in response to a consequence).

Figure 3 illustrates the distinction between classical and operant conditioning as behaviourist approaches to learning in more detail.

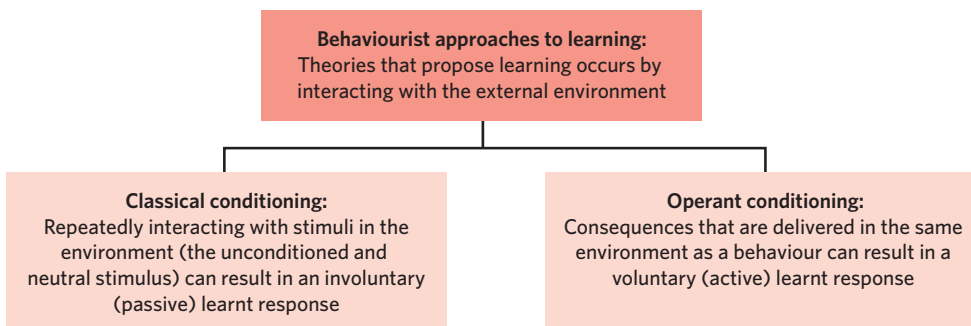


Figure 3 Classical and operant conditioning as behaviourist approaches to learning

Table 4 compares classical conditioning and operant conditioning more comprehensively, presenting a detailed account of the similarities and differences between both approaches to learning.

Table 4 Similarities and differences between classical and operant conditioning

| Similarities | Differences |
|--|---|
| <ul style="list-style-type: none"> Both are behaviourist approaches to learning. Both are three-phase processes of learning. Both require several trials in order for learning to occur. For example, during classical conditioning, the neutral and unconditioned stimuli need to be repeatedly paired in order for learning to occur. In operant conditioning, learning is more likely to occur if the consequence occurs several times in response to a behaviour. | <ul style="list-style-type: none"> Operant conditioning involves learning a voluntary behaviour, whereas classical conditioning involves learning an involuntary behaviour. Learners are active during operant conditioning, whereas learners are passive during classical conditioning. Operant conditioning requires a consequence, whereas there is no kind of consequence during classical conditioning. |

LESSON LINK

In lesson **2A The nervous system**, you learnt that the somatic nervous system is responsible for coordinating the voluntary movement of skeletal muscles, whereas the autonomic nervous system is responsible for the involuntary movement of visceral muscles, organs, and glands. As a result, operant conditioning involves learning a behaviour usually coordinated by the somatic nervous system, whereas classical conditioning involves learning a behaviour usually coordinated by the autonomic nervous system.

Theory summary

In this lesson, you learnt about operant conditioning as a behaviourist approach to learning, including its three phases: antecedent, behaviour, and consequence. You also compared operant conditioning to classical conditioning. The three phases of operant conditioning are summarised in figure 4, with the types of consequences included.

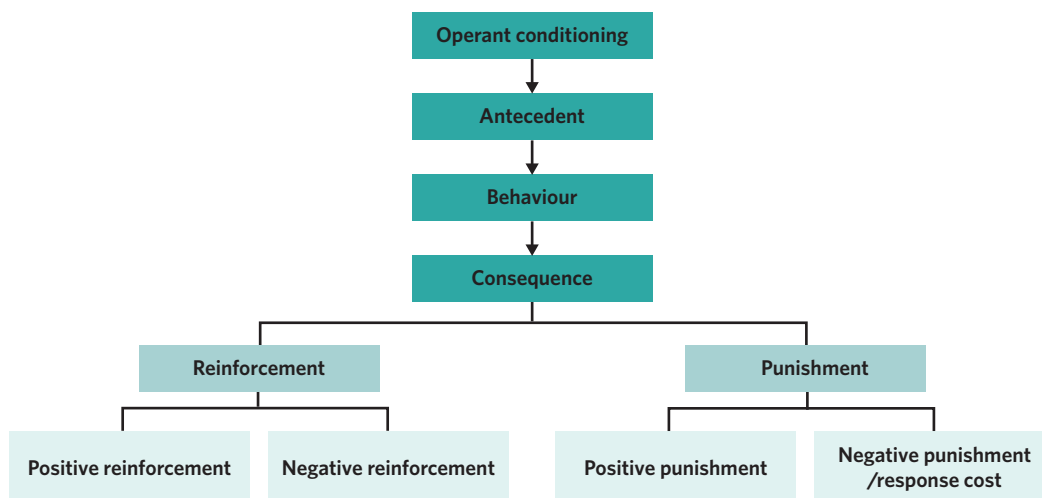


Figure 4 Summary of operant conditioning as a three-phase process, including its consequences

4B Questions

Theory review

Question 1

Operant conditioning, like classical conditioning, is a/an

- A. unconscious approach to learning.
- B. form of classical conditioning.
- C. behaviourist approach to learning.

Question 2

The three phases of operant conditioning are _____, behaviour, and consequence.

Which of the following best fills in the blank?

- A. antecedent
- B. before conditioning

Question 3

The behaviour during operant conditioning is involuntary, whereas the conditioned response during classical conditioning is voluntary.

- A. True.
- B. False.

Question 4

Which of the following is associated with reinforcement **(Select all that apply)**

- I. An increased likelihood that the behaviour will occur again.
- II. A decreased likelihood that the behaviour will occur again.
- III. The presentation of an undesirable stimulus.
- IV. The removal of an undesirable stimulus.

Question 5

During operant conditioning, _____ is used to decrease the likelihood of a behaviour occurring again in the future.

Which of the following best fills in the blank?

- A. reinforcement.
- B. punishment.

Question 6

Negative reinforcement involves an unpleasant experience or consequence for the learner.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 7

Which of the following sentences is most correct?

- A. Negative reinforcement involves **removing an undesirable stimulus** to **increase the occurrence of a particular behaviour**.
- B. Negative reinforcement involves **presenting an undesirable stimulus** to **decrease the occurrence of a particular behaviour**.

Question 8

Which of the following sentences is most correct?

- A. The antecedent refers to the **stimulus or event** that precedes and often elicits a particular behaviour.
- B. The antecedent refers to the **behaviour** that prompts a consequence to occur.

Text analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 9 and 10.

Kim wants to encourage her daughter to stop sleeping in so late on the weekend. She thinks that her daughter would be more productive and get more study done if she were to wake up early. Kim usually cooks her daughter breakfast on the weekend when she wakes up, which her daughter enjoys greatly, but has decided to stop doing this when her daughter wakes up in the afternoon. Kim's daughter slept until 2pm on the first Saturday after Kim made this decision, so Kim tells her that she is not making her breakfast as a result.

Question 9

Which of the following statements reflects the consequence of negative punishment?

- A. 'Kim usually cooks her daughter breakfast on the weekend when she wakes up, which her daughter enjoys greatly, but has decided to stop doing this when her daughter wakes up in the afternoon.'
- B. 'Kim wants to encourage her daughter to stop sleeping until midday on the weekend.'

Question 10

Which of the following statements reflects a behaviour in this example?

- A. 'Kim tells (her daughter) that she is not making her breakfast as a result.'
- B. 'Kim's daughter slept until 2pm.'

Exam-style

Remember and understand

Question 11 (1 MARK)

In the consequence phase of operant conditioning, negative reinforcement involves

- A. presenting the subject with a desirable stimulus.
- B. taking a desirable stimulus away from the subject.
- C. presenting the subject with an undesirable stimulus.
- D. taking an undesirable stimulus away from the subject.

Question 12 (1 MARK)

The antecedent in operant conditioning refers to

- A. the stimulus or event that prompts the subject's behaviour.
- B. the subject's behaviour.
- C. the consequence of the subject's behaviour.
- D. the stimulus that the subject receives when they display the behaviour.

Question 13 (2 MARKS)

Compare positive punishment and negative punishment.

Question 14 (4 MARKS)

Describe operant conditioning as a three-phase process of learning.

Apply and analyse

Use the following information to answer questions 15–18.

Doctor Modric conducted an experiment that involved hungry mice being placed inside of a box. They designed this box so that a button could be pressed by the mice if they stood still on top of it. If this occurred, food would automatically be released into the box.

Adapted from VCAA Psychology exam 2017 Q8

Question 15 (1 MARK)

In this experiment, the behaviour was

- A. the dish.
- B. hunger.
- C. receiving food.
- D. pressing the button.

Question 16 (1 MARK)

For the mice, receiving the food is

- A. positive punishment.
- B. negative punishment.
- C. positive reinforcement.
- D. negative reinforcement.

Question 17 (1 MARK)

The antecedent in Doctor Modric's experiment is

- A. the mice's condition of hunger.
- B. the mice receiving food.
- C. the mice pressing the button.
- D. positive reinforcement.

Question 18 (1 MARK)

What would be the most effective control group in Doctor Modric's experiment?

- A. A group of mice being put in the box that had just been fed (i.e. are not hungry).
- B. A group of mice being put in a separate box that has a button which does not release food when pressed.
- C. Another type of animal being put in the box as a point of comparison.
- D. Using another type of food to reinforce the mice's behaviour.

Question 19 (3 MARKS)

Bethany was disappointed by her most recent school report. In order to improve her grades, she decided to ask her parents if she could stop taking the bins out each week, so long as she spent at least an hour each night studying after school. The strategy works and Bethany finds that she is studying much more frequently in order to avoid the experience of taking the bins out each week.

Using the language of operant conditioning, describe how Bethany learnt to spend more time studying.

Questions from multiple lessons**Question 20** (2 MARKS)

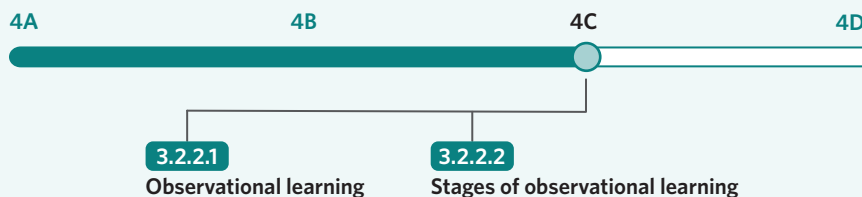
Different behaviourist approaches to learning are responsible for different kinds of learnt behaviours. In particular, a different behaviourist approach to learning is required for voluntary behaviour than that which is required for involuntary behaviours. As a result, different divisions of the nervous system are dominant when using different behaviourist approaches to learning.

With reference to divisions of the nervous system, compare classical and operant conditioning.

4C Observational learning

STUDY DESIGN DOT POINT

- social-cognitive approaches to learning, as illustrated by observational learning as a process involving attention, retention, reproduction, motivation and reinforcement



'Watch and learn' is a phrase you have probably heard at some point in your life. You may have heard it when you were in the kitchen watching one of your parents prepare a meal. Or maybe one of your annoying classmates said it to you when they believed they could do something better than you could. Regardless of where you've heard it, the phrase highlights how people can learn by observing others.

In this lesson, you will learn about observational learning, which is a social-cognitive approach to learning. In particular, you will learn about how an individual must progress through the five stages of observational learning (attention, retention, reproduction, motivation, and reinforcement) in order to successfully learn a behaviour.

Observational learning 3.2.2.1

Think about some of your everyday behaviours, such as walking or using cutlery. When you were younger, you may have learnt how to do these things by observing others and copying their actions. In this section of the lesson, you will learn about observational learning as a social-cognitive approach to learning.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Social-cognitive approaches to learning theories that propose learning takes place in a social setting and involves various cognitive processes

Theory details

Social-cognitive approaches to learning involve theories that propose learning takes place in a social setting and involves various cognitive processes. This approach to learning is closely linked to the social learning theory, which was first proposed by psychologist Albert Bandura. In the 1960s, Bandura conducted a variety of studies investigating how children learn by imitating others. From these studies, he suggested that learning occurs in a social setting and behaviours can be learnt by watching and imitating others in these settings. His theory was later revised as the social-cognitive theory in order to highlight that learning is not only a social process but a cognitive one too. This revised approach to learning emphasises the importance of cognitive processes, such as concentration, motivation, memory, and decision-making, when learning in a social setting. Observational learning is a social-cognitive approach to learning that emerged from Bandura's studies.

WANT TO KNOW MORE?

In the 1960s, Albert Bandura conducted a series of studies called the 'Bobo doll experiments' that aimed to investigate how children learn aggressive behaviour. His participants were young children aged between three and six years old. In one of his studies, the participants were split into two groups. The children in the experimental group watched an adult model engaging in violent and aggressive behaviour towards a bobo doll. The children in the control group watched an adult model calmly play with the doll. The children were then given the opportunity to play with bobo dolls. The results revealed that children who watched the aggressive adult model imitated more aggressive behaviour towards the bobo doll in comparison to the children who watched the calm adult model.

To learn more about Bandura's Bobo Doll Experiment, search for 'Bandura's Bobo Doll Experiment' (Everywhere Psychology, 2012) on YouTube and watch the 3-minute and 47-second video that includes real footage from the experiments.

Observational learning is a process of learning that involves watching the behaviour of a model and the associated consequence of that behaviour. In our everyday lives, people display a wide range of behaviours that we are able to observe. From watching these behaviours and the associated consequences, we are able to learn from someone else's experiences. In this way, we can be indirectly conditioned by watching someone else's conditioning. This is why observational learning can also be referred to as vicarious (experienced through watching other people's activities, rather than doing the activities yourself) conditioning.

In observational learning, there is a learner and a model. The **model** is the individual who is performing the behaviour that the learner observes. In this way, observational learning can also be referred to as modelling. Furthermore, the learner has an active role in learning as they need to watch and pay attention to the model in order to be able to imitate the behaviour.

Observational learning (also known as social learning, vicarious conditioning, or modelling) a process of learning that involves watching the behaviour of a model and the associated consequence of that behaviour

Model (in relation to observational learning) the individual who is performing the behaviour that is being observed

Model (in relation to observational learning) the individual who is performing the behaviour that is being observed

WANT TO KNOW MORE?

Bandura (1963) proposed that there are three types of models: live, verbal, and symbolic. These are explained in figure 1.

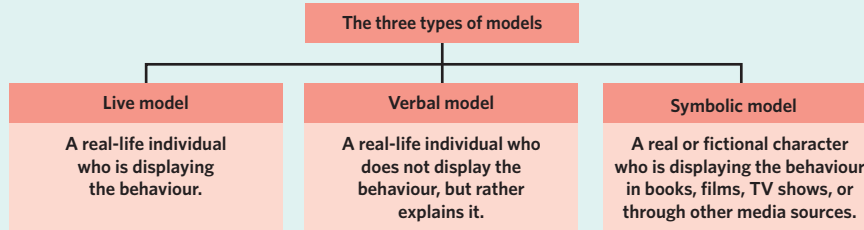


Figure 1 There are three types of models associated with observational learning

Stages of observational learning 3.2.2.2

Have you ever accidentally zoned out when someone was showing you how to do something? Were you then able to copy the behaviour or did you find it difficult because you couldn't remember how to do it? This highlights how some cognitive processes, like attention and retention, are crucial in order to successfully learn something through observational learning. In this section of the lesson, you will learn about the five stages of observational learning.

Theory details

In order to successfully learn a behaviour through observational learning, the learner must progress through five stages. These stages are attention, retention, reproduction, motivation, and reinforcement. The five stages of observational learning are shown in figure 2.

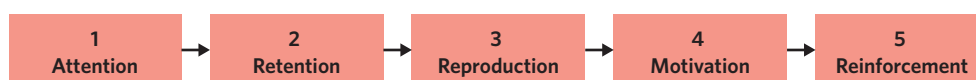


Figure 2 The five stages of observational learning

Table 1 explains the stages of observational learning and table 2 provides an example of how an individual may progress through these stages.

LESSON LINK

In lesson **4A Classical conditioning** and **4B Operant conditioning**, you learnt about behaviourist approaches to learning as demonstrated through classical and operant conditioning. Social-cognitive approaches to learning are different to behaviourist approaches to learning. While behaviourist approaches to learning emphasise the importance of interacting with the external environment, social-cognitive approaches to learning include the internal cognitive processes that accompany learning. Nevertheless, social-cognitive approaches do not replace behaviourist approaches, and neither approach is necessarily the 'right' way of learning. Instead, they both exist to explain how learning behaviours can occur through different processes.

Attention (in relation to observational learning) the first stage of observational learning in which individuals actively focus on the model's behaviour and the consequences of the behaviour

Retention (in relation to observational learning) the second stage of observational learning in which individuals create a mental representation to remember the model's demonstrated behaviour

Reproduction (in relation to observational learning) the third stage of observational learning in which the individual must have the physical and mental capabilities to replicate the behaviour

Motivation (in relation to observational learning) the fourth stage of observational learning in which the individual must want to reproduce the behaviour

Reinforcement (in relation to observational learning) the fifth stage of observational learning in which the individual receives a positive consequence for the behaviour which makes them more likely to reproduce the behaviour again in the future

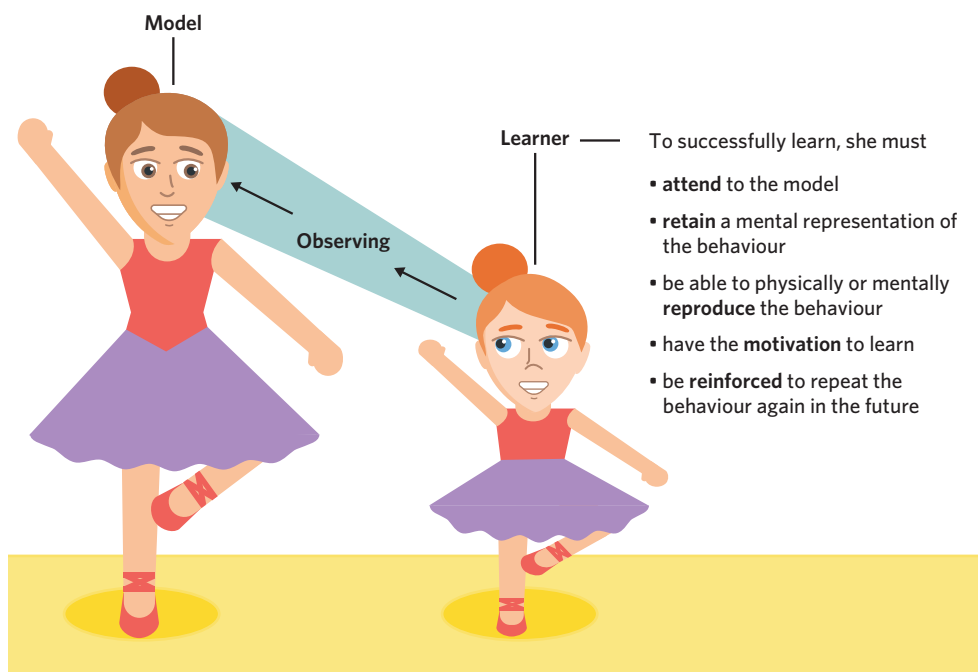
Table 1 The five stages of observational learning

| Stage | Explanation |
|----------------------|---|
| Attention | <p>Attention is the first stage of observational learning in which individuals actively focus on the model's behaviour and the consequences of the behaviour. If the individual does not actively concentrate on the behaviour the model is displaying, then it is unlikely that they will retain this information.</p> <p>Bandura identified that there are factors that may influence whether learners pay attention to models. In particular, Bandura proposed that learners are more likely to pay attention to the model when the model is:</p> <ul style="list-style-type: none"> perceived positively liked of high status (such as a celebrity) similar to the learner familiar to the learner visible and stands out from others behaving in a way that the learner believes can be imitated. |
| Retention | <p>Retention is the second stage of observational learning in which individuals create a mental representation to remember the model's demonstrated behaviour. If the individual has met this stage this means that the information they have paid attention to is stored in their memory. This information can then be accessed later on when the individual goes to perform the behaviour.</p> |
| Reproduction | <p>Reproduction is the third stage of observational learning in which the individual must have the physical and mental capabilities to replicate the behaviour. Although an individual may have paid attention to the model and retained the information, if they do not have the physical or mental ability to successfully replicate the behaviour, then they will be unable to reproduce the behaviour.</p> <p>Often, reproduction is the stage that many people do not achieve. This is because it tends to be easier for individuals to attend to and retain information, and have motivation than it is to gain physical and/or mental abilities. This is because people lack control over their physical and mental capabilities, which can make it more challenging to complete this stage. For example, an individual with a broken leg may meet all stages of observational learning for playing netball but cannot meet reproduction, regardless of their effort in other stages.</p> |
| Motivation | <p>Motivation is the fourth stage of observational learning in which the individual must want to reproduce the behaviour. Motivation is a cognitive process in which individuals must desire to perform the behaviour they are observing after they have observed it. This motivation can be either intrinsic or extrinsic.</p> <ul style="list-style-type: none"> Intrinsic motivations occur from within the individual, such as the desire to perform well on an exam. Extrinsic motivations occur from factors that are external to the individual, such as the desire to receive praise from your teacher for doing well on an exam. |
| Reinforcement | <p>Reinforcement is the fifth stage of observational learning in which the individual receives a positive consequence for the behaviour which makes them more likely to reproduce the behaviour again in the future. There are different types of reinforcement that are outlined below.</p> <ul style="list-style-type: none"> Self-reinforcement: the behaviour is reinforced through factors internal to the individual, such as feeling proud of themselves. External reinforcement: the behaviour is reinforced by factors external to the individual, such as receiving an award. Vicarious reinforcement: the behaviour is reinforced by observing the reinforcement of another person performing the same behaviour. This can enhance the individual's motivation and make them more likely to reproduce the behaviour again in the future, despite not being directly reinforced themselves. |

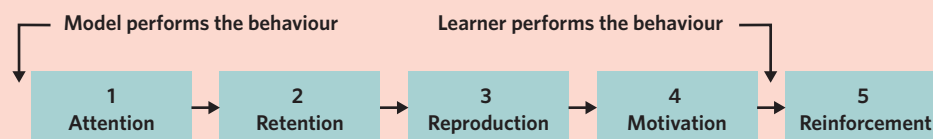
Table 2 An example of the five stages of observational learning

| Stage | Example |
|-------------------------|--|
| 1. Attention | Isabel watches her friend Tarsh kick a football. Isabel concentrates on how Tarsh holds the ball and swings her leg to kick it. |
| 2. Retention | Isabel creates a mental representation of Tarsh kicking the football. She remembers how Tarsh holds the ball, drops it, and swings her leg to kick it. |
| 3. Reproduction | Isabel has the physical capabilities to replicate the behaviour of kicking the football as she is physically fit and coordinated. |
| 4. Motivation | Isabel is motivated to learn how to kick a football as she wants to play a football game with Tarsh. |
| 5. Reinforcement | After Isabel successfully kicks the football, Tarsh praises her and Isabel feels proud of herself. Isabel wants to continue practising kicking the football. |

Additionally, figure 3 provides a visual summary of the processes involved in observational learning.

**Figure 3** Processes involved in observational learning**USEFUL TIP**

It is important to note that the individual does not perform the behaviour until they progress through the stages of attention, retention, reproduction, and motivation. Reinforcement is the only stage that occurs after the behaviour is performed. Figure 4 shows when the model performs the behaviour and when the learner performs the behaviour during the stages of observational learning.

**Figure 4** The model performs the behaviour prior to the stages of observational learning while the learner has to progress through the first four stages before they perform the behaviour

Theory summary

In this lesson, you have learnt about social-cognitive approaches to learning. Specifically, you learnt about observational learning and how individuals must progress through the five stages of attention, retention, reproduction, motivation, and reinforcement in order to successfully learn from the model. Figure 5 provides a summary of this lesson.

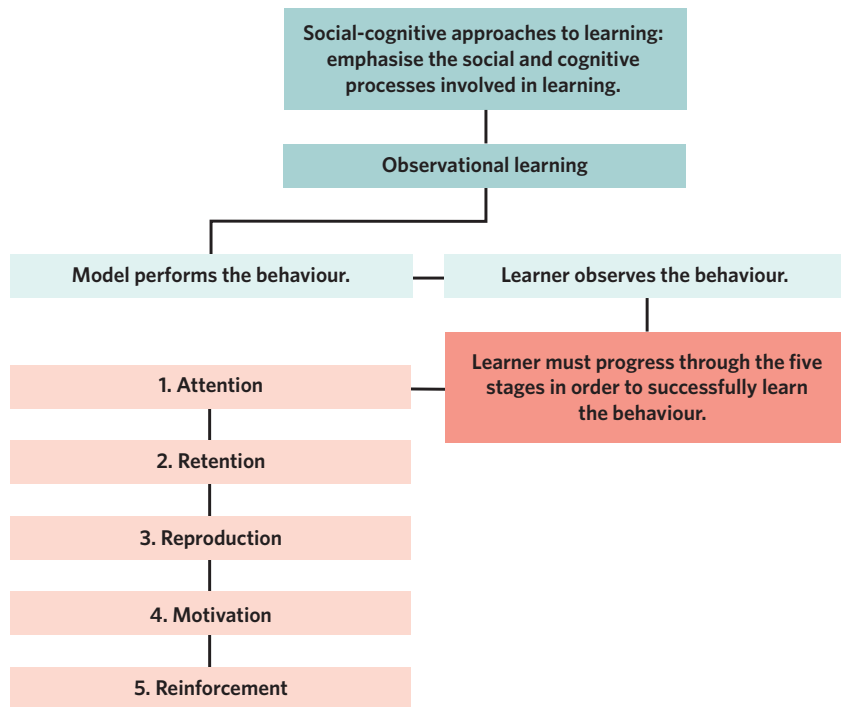


Figure 5 Summary of lesson 4C

USEFUL TIP

To help you remember the order of the five stages of observational learning (Attention, Retention, Reproduction, Motivation, and Reinforcement), you can use the acronym 'All Roads Require Maintenance Regularly.'



4C Questions

Theory review

Question 1

Social-cognitive approaches to learning emphasise **(Select all that apply)**

- I. social settings.
- II. biological mechanisms.
- III. cognitive processes.
- IV. stimulus associations.

Question 2

An example of a social-cognitive approach to learning is

- A. operant conditioning.
- B. observational conditioning.
- C. classical conditioning.
- D. observational learning.

Question 3

In observational learning, the _____ observes a _____ perform a behaviour.

Which of the following best fills in the blanks?

- A. model; learner
- B. learner; model

Question 4

In observational learning, the learner must progress through three stages in order to successfully learn a behaviour.

- A. True.
- B. False.

Question 5

Which of the following are stages of observational learning? **(Select all that apply)**

- I. Attention.
- II. Motivation.
- III. Replication.
- IV. Punishment.
- V. Reinforcement.
- VI. Representation.
- VII. Retention.
- VIII. Reproduction.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Use the following information to answer questions 6-10.

Polly, Ester, Fab, and Rick are all learning how to knit in their textile class. Their textile teacher is performing a demonstration of how to knit a scarf at the front of the class. Polly is on her phone and is not concentrating on the teacher's demonstration. Although Fab is paying attention, he has recently injured his wrist trying to juggle and is unable to move his left hand. Ester is also paying attention to the teacher as she goes through the steps, however, she struggles to remember the first few steps. Rick is paying attention to the teacher and remembers all the steps. He is physically able to knit and is also really excited to learn how to knit because his mother wants him to make his grandmother a scarf for her birthday. Once the teacher finishes the demonstration, she tells the students to attempt it by themselves.

Question 6

In this scenario, a similarity between Polly, Ester, Fab, and Rick is that they are

- A. active learners who do not need to engage in mental processes to successfully learn.
- B. models who are demonstrating the behaviour to be learned.
- C. active learners who need to engage in mental processes to successfully learn.

Question 7

Rick wants to learn how to knit because his mother wants him to make his grandmother a scarf for her birthday. This is an example of an

- A. intrinsic motivation.
- B. extrinsic motivation.

Question 8

Which of the following statements is true?

- A. Polly, Fab, and Ester have met the attention stage of observational learning.
- B. Rick and Fab have met the reproduction stage of observational learning.
- C. Fab and Ester have met the attention stage of observational learning.
- D. Ester and Rick have met the retention stage of observational learning.

Question 9

Ester is unable to remember the first few steps of the demonstration. This most likely suggests that

- A. she has been unable to create a mental representation of the first few steps and has therefore not been able to meet the stage of retention.
- B. she has severe short-term memory loss and therefore is unable to meet the stage of reproduction.
- C. she has not been paying attention to the model and is therefore unable to meet the stage of attention.
- D. she does not want to learn the first few steps of the demonstration and is therefore unable to meet the stage of motivation.

Question 10

Which student is most likely to successfully learn how to knit and why?

| | Student | Reason |
|----|---------|---|
| A. | Polly | Polly has paid close attention to her phone and is therefore likely to successfully knit. |
| B. | Ester | Ester has met the stages of attention, reproduction, and motivation and is therefore likely to successfully knit. |
| C. | Fab | Fab has met the stages of attention, retention, reproduction, and motivation and is therefore likely to successfully knit. |
| D. | Rick | Rick has met the stages of attention, retention, reproduction, and motivation and is therefore likely to successfully knit. |

Exam-style**Remember and understand****Question 11** (1 MARK)

Which of the following correctly outlines the order of the stages involved in observational learning?

- A. Retention, attention, reproduction, motivation, reinforcement.
- B. Attention, retention, reproduction, motivation, reinforcement.
- C. Attention, retention, motivation, reproduction, reinforcement.
- D. Motivation, attention, retention, reproduction, reinforcement.

Question 12 (1 MARK)

Motivation is the fourth stage of observational learning and involves an individual's

- A. ability to pay attention to the model.
- B. desire to learn a behaviour.
- C. ability to mentally reproduce the behaviour.
- D. consequences of performing a behaviour.

Question 13 (1 MARK)

Outline what is meant by observational learning.

Question 14 (2 MARKS)

Observational learning involves the stage of attention.

Using an example, describe the stage of attention in observational learning.

Apply and analyse

Question 15 (1 MARK)

12-year-old Malik does not do his maths homework even though he has watched his older brother do his homework so many times. He also reminded his younger sister to do her maths homework.

In terms of observational learning, Malik will most likely do his maths homework if he

- A. has the motivation to do his maths homework.
- B. pays more attention to his brother's behaviour.
- C. forms a mental representation of doing his maths homework.
- D. is developmentally ready to complete mathematical sums.

Adapted from VCAA Psychology exam 2019 Q15

Question 16 (1 MARK)

Chitarra wanted to learn guitar but she could not afford to attend classes with her friends. Instead, she decided to watch videos on the internet to learn how to play the different chords. Chitarra could describe all the chords in detail. Yet, despite practising all the chords and receiving encouragement from her friends, she could not successfully play them.

Which stages of observational learning did Chitarra most likely achieve?

- A. Attention, retention, motivation, reproduction.
- B. Attention, retention, motivation, reinforcement.
- C. Motivation, attention, reproduction, reinforcement.
- D. Motivation, retention, reproduction, reinforcement.

Adapted from VCAA Psychology exam 2017 Q12

Use the following information to answer questions 17 and 18.

Camila is 11 years old and loves her big sister, Daniella. Daniella recently learnt how to do her makeup. When Daniella applies makeup successfully, her mother compliments her.

Question 17 (1 MARK)

Camila is likely to learn how to do her own makeup due to which stage of observational learning and associated reason?

| | Stage of observational learning | Associated reason |
|----|---------------------------------|---|
| A. | Attention | Camila idolises Daniella. |
| B. | Retention | Camila has the physical capabilities to apply makeup. |
| C. | Motivation | Camila creates a mental representation of how Daniella does her makeup. |
| D. | Reproduction | Camila wants to learn how to apply makeup. |

Adapted from VCAA Psychology exam 2021 Q11

Question 18 (1 MARK)

Camila notices how her mum compliments Daniella when she applies makeup. This motivates Camila to successfully apply makeup. What type of reinforcement is Camila experiencing?

- A. Self-reinforcement, as her actions are reinforced directly by her mother.
- B. Vicarious reinforcement, as her actions are reinforced directly by her mother.
- C. Self-reinforcement, as she is reinforced indirectly by observing the consequences of Daniella's actions.
- D. Vicarious reinforcement, as she is reinforced indirectly by observing the consequences of Daniella's actions.

Question 19 (9 MARKS)

Dr Osman wants to replicate a famous experiment on observational learning to investigate if social behaviours, such as aggression, can be learnt through observation. Dr Osman approaches the staff at his son's school to recruit participants for his study. He recruited 12 seven-year-old boys to be involved. Dr Osman pre-tests the boys on their baseline levels of aggression by observing them one lunchtime on the playground. He judges their aggressive behaviour on a rating scale. He then assigns them to one of three conditions in which he manipulates the type of model. The conditions are outlined below.

- Condition 1: Aggressive model reinforced.
- Condition 2: Aggressive model punished.
- Condition 3: No model.

Following the conditions, Dr Osman watches the children play on the playground and assesses their aggressive behaviour on a rating scale. He then compares the pre-test score for each boy with their post-test scores.

- a. Are the children able to provide their own informed consent? Justify your response. (2 MARKS)
- b. Dr Osman aims to investigate whether aggression can be learnt through observation. Why is it important that Dr Osman compares their pre-test scores to their post-test scores? (2 MARKS)
- c. Identify one stage involved in observational learning that demonstrates the advantage of using a male model in the experiment. Justify your response. (2 MARKS)
- d. In what condition are the children more likely to learn aggressive behaviour? (3 MARKS)

Evaluate**Question 20** (4 MARKS)

A new advertising campaign for a perfume targeted at teenage girls features a celebrity. In the campaign, the celebrity is shown to be attracting men by wearing the perfume.

Name two different stages involved in observational learning that demonstrate the strength of using a celebrity to advertise the perfume. Justify your response for each stage.

Adapted from VCAA Psychology exam 2020 Q4b

Questions from multiple lessons**Question 21** (1 MARK)

Unlike classical conditioning, both operant conditioning and observational learning involve a particular process in order to successfully learn the desired behaviour. What is this process?

- A. Reinforcement.
- B. Motivation.
- C. Active learning.
- D. Stimulus associations.

Adapted from VCAA Psychology exam 2017 Q9

Question 22 (8 MARKS)

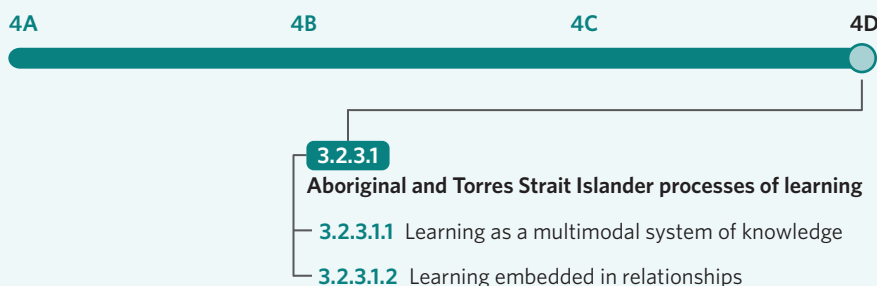
Asahi is trying to teach his daughter, An, how to use chopsticks when eating noodles. Asahi recently watched a video on classical conditioning and wants to try it to teach An how to use chopsticks. In order to do this, Asahi presents her noodles on her placemat and then gives her the chopsticks. When she uses chopsticks successfully, Asahi will give her dessert. By doing this, he hopes that An will learn that when she sees noodles, she will know to use chopsticks.

- a. Is An likely to learn how to use chopsticks from classical conditioning? Justify your response. (3 MARKS)
- b. With reference to the five stages of observational learning, explain how An could successfully learn how to use chopsticks by watching her dad use chopsticks. (5 MARKS)

4D Aboriginal and Torres Strait Islander approaches to learning

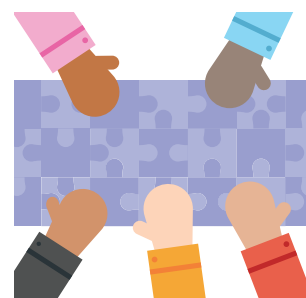
STUDY DESIGN DOT POINT

- approaches to learning that situate the learner within a system, as illustrated by Aboriginal and Torres Strait Islander ways of knowing where learning is viewed as being embedded in relationships where the learner is part of a multimodal system of knowledge patterned on Country



What is your favourite subject at school? Why do you think it is your favourite subject? For some people, their favourite subject is the one that they see as having the most relevance to their life. For example, perhaps Psychology is your favourite subject because you want to study it when you finish school. For others, their favourite subject is the one that is taught by their favourite teacher, or the one that they share with close friends. For these students, the close relationships they have with the people in their class contribute greatly to their learning experience.

For Aboriginal and Torres Strait Islander peoples, like many others, the process of learning is driven by being part of a system of relevant knowledge that supports community needs and is inherently tied to the relationships between teacher and learner. In this lesson, you will learn about the interconnected nature of Aboriginal and Torres Strait Islander approaches to learning, including the experience of learning within a multimodal system and the importance of relationships between learners and teachers.



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Aboriginal and Torres Strait Islander processes of learning 3.2.3.1

So far in this chapter, you have learnt about behaviourist and social-cognitive approaches to learning. This lesson will focus on another approach to learning, whereby the learner is situated within a system of interconnected knowledge. For First Nations peoples, learning is not only dependent on the relationships between learner and teacher, but also immersive; learning takes place by seeing, hearing, feeling, and doing. What is being learnt is inherently relevant to the way of life for an individual and community, and is connected to time, place, ancestry, and spirit.

USEFUL TIP

There are many ways for non-Indigenous people to respectfully refer to Aboriginal and Torres Strait Islander peoples in Australia, including 'Indigenous peoples' and 'First Nations'. However it is important to note that these are English words and names. As an alternative, the name of the specific language group (for example, the Wurundjeri people of the Kulin nations in Victoria), can also be used if it is known. This is how many Indigenous people refer to themselves.

Throughout the lessons in this book, these terms are used interchangeably. Different people will prefer different terms to be used, so it is best to ask if you are unsure.

Continues ►

USEFUL TIP

The term 'kin' reflects a complex system of family and community for First Nations peoples. Aboriginal and Torres Strait Islander approaches to learning are shaped by a kinship system, as are other lived experiences (such as social and emotional wellbeing, which will be explored later in this book). To learn more about what is meant by 'kin' or 'kinship', search for 'Family and kinship' (Reconciliation Australia, 2013) on YouTube and watch the 1-minute and 9-second video.

USEFUL TIP CONTINUED

There are a few things to note when writing these terms:

- Always use a capital letter, as these terms are proper nouns (like a name). Just like 'Australian' requires a capital letter, so does 'Indigenous', 'Aboriginal', and 'First Nations'.
- These terms are usually written in plural. This is to reflect the great diversity among Aboriginal and Torres Strait Islander communities. There are many different Aboriginal language groups, cultural practices and communities throughout Australia, so it is important that this is reflected in the terminology used.

Theory details

In Aboriginal and Torres Strait Islander communities, learning is not restricted to a classroom with one teacher and multiple students. Instead, learning is relational and interconnected (Harrison et al., 2019), taking place in the community, where family and kin learn from each other. Additionally, learning is not broken up into separate subjects with students learning about one thing at a time; instead, the connections between concepts are highlighted and understood, creating a holistic process of learning.

Learning as a multimodal system of knowledge 3.2.3.1.1

KEY TERMS

Systems of knowledge

(in relation to Aboriginal and Torres Strait Islander approaches to learning) knowledge and skills are based on interconnected social, physical, and spiritual understandings, and in turn, inform survival and contribute to a strong sense of identity

Country (in relation to Aboriginal and Torres Strait Islander cultures) traditional lands of a particular language or cultural group, including both geographical boundaries and the spiritual, emotional, and intellectual connections to and within it

What is a system of knowledge?

Fundamentally, for Aboriginal and Torres Strait Islander peoples, learning is a process that takes place within complex **systems of knowledge**, meaning that knowledge and skills are based on interconnected social, physical, and spiritual understandings, and in turn, inform survival and contribute to a strong sense of identity. Such systems of knowledge:

- are developed by communities working together and sharing traditional expertise and knowledge. In this way, learning is deeply rooted in relationships between people, a concept that will be explored later in this lesson.
- are informed by culture, including who can learn what and where. For example, in Aboriginal and Torres Strait Islander cultures, there is a separation of 'men's business' and 'women's business'. This is not a discriminatory or sexist separation, but rather one that focuses on particular roles and ceremonies that are specific and sacred to men and women individually (Deadly Story, N.D.). These separate knowledges and understandings contribute to the community's overall systems of knowledge.
- consist of information that is highly relevant to day-to-day living and survival.
- are informed by spiritual and ancestral knowledge. For example, Dreaming stories, which are the foundation of Aboriginal and Torres Strait Islander cultures, communicate vital knowledges, values, traditions, and laws to future generations (Artlandish, N.D.). You will learn more about connections with spirituality and ancestry in lesson 8A Ways of considering mental wellbeing.
- consist of information that is highly interconnected. For example, if someone were learning about how to hunt kangaroos, they would not simply learn about the weapons needed to hunt, but rather learn simultaneously about the kangaroo's behaviour patterns, the plants they eat, how they grow, and the predators that hunt them. In this way, they learn all about the animal, and the role and impact this animal has on the ecosystem, in addition to learning vital survival skills relating to hunting. Such systems of knowledge are depicted in figure 1.
- are patterned (created) on **Country**, or the traditional lands of a particular language or cultural group. Country encompasses both geographical boundaries and the spiritual, emotional, and intellectual connections to and within it. To understand the centrality of Country to learning for Aboriginal and Torres Strait Islander peoples, you can think about the process of learning how to play a team sport. It would make very little sense to learn the rules and strategy of netball on a football field, as learning how to play the game is deeply connected to the physical make-up of the court, including the size of the court and the lines that indicate where players can go. Although you could learn some techniques, like how to catch the ball without stepping, you cannot get a deep understanding of the game and how to play it without being on a netball court. Likewise, learning in Aboriginal and Torres Strait Islander communities is inherently tied to Country, or the place relevant to the knowledge being learnt. You will learn more about the centrality of Country in lesson 8A Ways of considering mental wellbeing.

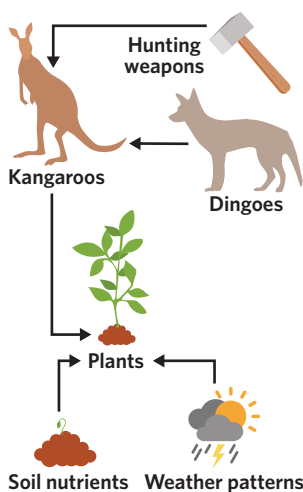


Figure 1 Systems of knowledge

USEFUL TIP

For Aboriginal and Torres Strait Islander peoples, concepts of land ownership are very different to Eurocentric legal systems. Emma Lee (2017) wrote that 'country is more than a named geography; it is a totality of emotive, physical, intellectual, and metaphorical connections that has its own agency and influences' (p.95). To reflect this central importance of land to Aboriginal and Torres Strait Islander cultures and traditions, and to separate it from the regular common noun 'country', it is convention to refer to 'Country' in this context with a capital C.

What is meant by multimodal?

Aboriginal and Torres Strait Islander approaches to learning are **multimodal** by nature, meaning that they use a variety of methods. There are many ways this occurs, some of which are summarised in figure 2 and expanded upon in table 1.

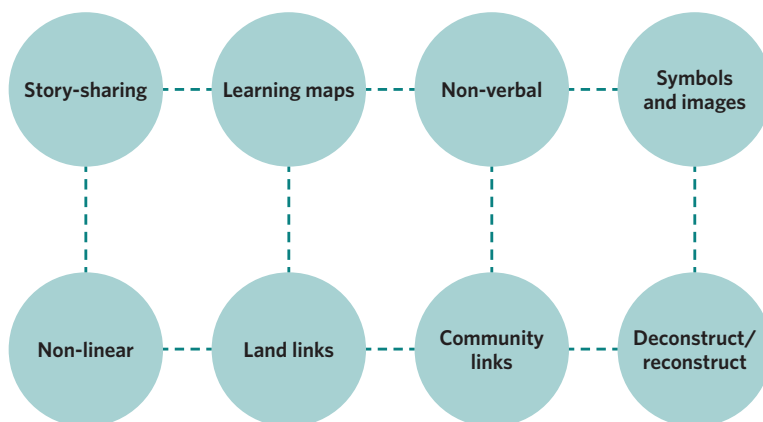


Figure 2 The 8 ways of Aboriginal learning framework (Yunkaporta, 2010)

Table 1 An explanation of the elements within the 8 ways of Aboriginal learning framework

| Element | Description | Example |
|--------------------|---|--|
| Story-sharing | Learning takes place through narrative and story-sharing | Sharing Dreaming stories to communicate complex knowledge relating to the natural world and survival. |
| Learning maps | Planning and visualising processes and knowledge | Creating a visual representation or mindmap of all the key terms within an area of study in VCE Psychology, linking each topic with the relevant part of the body. This can also include when certain pages of the textbook will be read and the order in which you will learn them. A basic example of this is illustrated in figure 3. For more examples, type the URL 8ways.online/egs-mixed into your browser. |
| Non-verbal | Sharing knowledge through non-verbal means, including dance, art, and observation | Traditional dances where the movements reflect the patterns of certain animals. By observing others and participating in dancing rituals, individuals also learn the habits of the animal. Furthermore, through these dances, culture is taught and celebrated. To see this in action, search for 'Aboriginal Crane Dance' (Roco43, 2008) on YouTube and watch the 1-minute and 37-second video. |
| Symbols and images | Learning through images, symbols, and metaphors | Creating artwork that uses symbols to represent landmarks, animals or objects. An example of this from Meeanjin (Brisbane) is represented in figure 4. |

Continues ►

Multimodal using a variety of methods

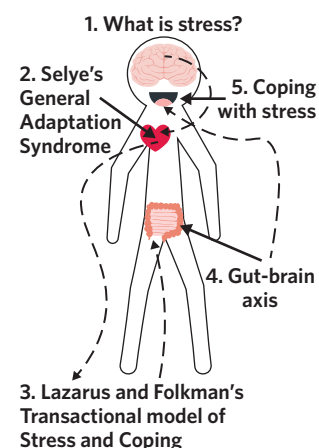


Figure 3 A learning map of chapter 3 of this book, relating concepts of stress to physical places in the human body



Figure 4 A pavement with Aboriginal artwork, including symbols

LESSON LINK

In lesson **4C Observational learning**, you learnt about a social-cognitive approach to learning whereby an individual learns through observing others. This approach is fundamental to learning within Aboriginal and Torres Strait Islander communities, whereby individuals learn through careful observation of others.

Table 1 Continued

| Element | Description | Example |
|--------------------------------|---|--|
| Land links | Learning and knowledge are inherently linked to nature, land, and Country | Content is linked to geographical landmarks and features. For example, rather than learning about photosynthesis (the process by which plants turn light into food in order to grow) from a textbook, you would go out to investigate plants in nature, comparing those that were exposed to a lot of sun with those that were not. |
| Non-linear | Thinking outside the square and taking knowledge from different viewpoints in order to build new understandings | Instead of learning about history by investigating one place at a time (for example, ancient Rome, ancient China or ancient Aboriginal Australia), you can learn about history by comparing common aspects of each society. For example, you could examine the tools used in each place, including how they were made and what they were used for. You could then compare them to tools used today, and therefore, broaden your understanding of the term 'tool' to include many different implements. |
| Deconstruct/Reconstruct | Breaking down a concept from whole to parts, and then applying it. Knowledge or skills are demonstrated (modelled), and then a learner is guided through each part in turn. Learners engage by watching and then doing. | Learning a new language by reading a passage in that language, and then examining the individual sentences and words within it. |
| Community links | Connecting learning to local values, needs, and knowledge. Learning does not occur in a vacuum, but rather is shared with others and used to meet the needs of the community. | When learning creative writing in an English class, the class may put together a book of stories that explore important spaces in the community. This is then published and made available for free in the local library. |

WANT TO KNOW MORE?

The multimodal nature of learning in Aboriginal and Torres Strait Islander communities, including the elements explored above, has been synthesised into an educational framework used by teachers all over Australia. This framework is commonly referred to as the '8 ways' framework (8 Ways, n.d). This framework serves an important purpose in the Australian education system by supporting all learners to access class materials and to understand Indigenous perspectives and ways of learning. Type the URL '8ways.online/egs-mixed' into your browser to learn more about the 8 ways framework.

Learning embedded in relationships 3.2.3.1.2

The process of learning for Australia's First Nations is deeply embedded in relationships.

- Relationships between concepts.
- Relationships between learner and teacher.
- Relationships between individuals, families, and communities.
- Relationships between all of the above and Country.

Throughout this lesson so far, you have read about the relationality (everything relating to each other) of Indigenous learning systems. In other words, you have learnt that different knowledge is deeply interconnected within complex systems and that learning is embedded within Country. In this way, learning is holistic and involves understanding the relationships between things, living beings, spirituality, and how they all interconnect with each other.

Additionally, Aboriginal and Torres Strait Islander peoples understand that human beings are interconnected with each other, the past, the ancestors, and the natural world, all at once. This is reflected in the very purpose of learning for Aboriginal communities, which is to remember and share cultural and survival knowledge to maintain cultural continuity and to protect complex ecosystems and biodiversity. Through the establishment and maintenance of these holistic systems of knowledge and learning, First Nations communities have thrived for millennia.

At the beginning of this lesson, you were asked to reflect on your favourite subject at school. For many people, choosing their favourite subject is less about the content and more about who is within the class. Perhaps you share the class with a good friend or your favourite subject is taught by your favourite teacher. This phenomenon reflects the idea that learning is embedded in relationships. In other words, you learn better with people whom you trust, who have taken the time to get to know you, and who respond to your needs well.

Likewise, for Aboriginal and Torres Strait Islander people, learning begins with the relationship between teacher and learner, and understanding the connections between people. Learning is family-based, with families and communities teaching themselves. Learning is also intergenerational, with younger generations learning from observing and interacting with older generations.

WANT TO KNOW MORE?

In Aboriginal and Torres Strait Islander cultures, it is a sign of respect for someone to refer to those older than them as Aunty or Uncle. This is especially true if they are family, but can be extended to others as a sign of respect. It is also common for individuals to refer to others, even those outside of their immediate family, as brothers, sisters, or cousins, depending on the closeness of their relationship.

The term Elder is also commonly used. Community Elders are highly respected and play a critical role in knowledge creation, sharing, and community decision-making.

This terminology reflects the importance and centrality of family and community in Aboriginal and Torres Strait Islander communities. When it comes to learning, Elders, Aunties, and Uncles are considered teachers and knowledge-holders, facilitating the learning of culture, values, and skills in younger generations.

Rather than diving straight into the content to be learnt, an environment of familiarity and trust is built. Traditionally, this stems from many familial interactions and relationships that have been created through generations. In other contexts, such as school, teachers ensure that they know their students and that their students know and trust them.

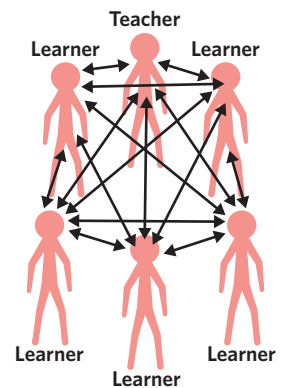


Figure 5 Learning is embedded in relationships between individuals, whereby each person knows and trusts each other

Theory summary

Throughout this lesson, you have learnt that Aboriginal approaches to learning base the learner within wider systems of knowledge. Within these systems, learning is multimodal, relying on observation, experience, and connection to the land. Moreover, learning is dependent upon the relationships between teacher and learner and their relationships with Country – they must understand each other, hold respect for, and feel a connection in order for learning to take place. Knowledge systems reflect a knowing that the past, the present, and the future co-exist and that knowledge itself is a show of respect for community, culture, and Country.

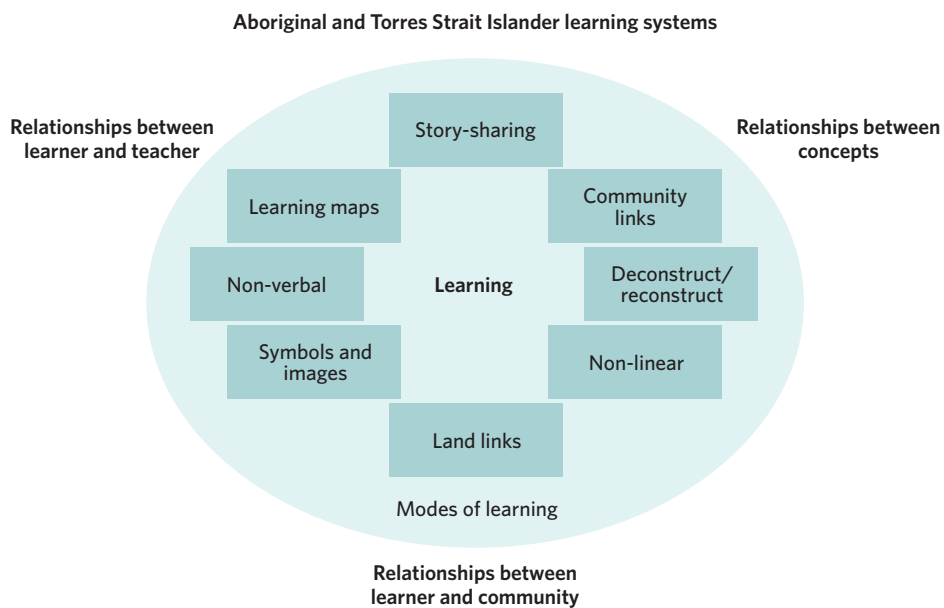


Figure 6 Lesson summary

4D Questions

Theory review

Question 1

Which of the following is true about systems of knowledge? **(Select all that apply)**

- I. They are developed by communities working together and sharing traditional expertise and knowledge.
- II. They don't consist of information that is highly relevant to day-to-day living and survival.
- III. They are informed only by spirits.
- IV. They are informed by culture.
- V. They consist of information that is highly interconnected.

Question 2

Which of the following **does not** accurately identify elements of the 8 ways Aboriginal learning framework?

| | | | |
|----|-------------------------|---------------|--------------------|
| A. | Story sharing | Learning maps | Symbols and images |
| B. | Land links | Non-linear | Community links |
| C. | Deconstruct/Reconstruct | Dance | Story sharing |

Question 3

Learning is not embedded in relationships.

- A. True.
- B. False.

Question 4

Who can Indigenous peoples learn from?

- A. A school teacher.
- B. Their community.
- C. Both A and B.

Question 5

In Indigenous communities, learning is not _____ but rather, a _____ process.

Which of the following best fills in the blank?

- A. connected; fixed
- B. segmented; holistic
- C. set; limited

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. Aboriginal and Torres Strait Islander approaches to learning are multimodal by nature, meaning that they use a **variety** of methods.
- B. Aboriginal and Torres Strait Islander approaches to learning are multimodal by nature, meaning that they use **a lot of** methods.

Question 7

Which of the following sentences is most correct?

- A. Learning is a process that takes place within a system of knowledge, meaning that knowledge and skills are based on **similar** social, physical, and spiritual understandings.
- B. Learning is a process that takes place within a system of knowledge, meaning that knowledge and skills are based on **interconnected** social, physical, and spiritual understandings.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Use the following information to answer questions 8–11.

Nullah, Kirra, and Mahlee all want to learn more about the land on which they live. Nullah listens to an Elder who narrates the story of Tiddalik the Frog and learns about the way their land was formed. Kirra participates in a traditional ceremony where she watches and learns a community dance performance that reenacts how their peoples came to live where they now do. Mahlee creates artwork in which they use symbols to represent native landmarks, animals, and objects.

Question 8

In this scenario, a similarity between Nullah, Kirra, and Mahlee is that

- A. they learn using an element from the Aboriginal learning framework.
- B. their learning is embedded in relationships.
- C. they are not learning effectively.

Question 9

Kirra watching a community dance performance is a combination of which Aboriginal learning framework element and other approach to learning?

- A. Classical conditioning and story sharing.
- B. Observational learning and land links.
- C. Observational learning and non-verbal.
- D. Operant conditioning and symbols and images.

Question 10

With reference to Mahlee's learning approach, which of the following is true for classical conditioning and creating artwork using symbols?

- A. Careful attention needs to be paid or else learning will not occur.
- B. Both are reinforced by punishments.
- C. Learning is voluntary.
- D. Meaning is given to a neutral stimulus that previously had no associations.

Question 11

Which of the following statements is true?

- A. Mahlee learns through a relationship between themselves and their wider community.
- B. Nullah learns through a relationship between concepts.
- C. Kirra learns through a relationship between learner and teacher.
- D. Mahlee learns through a relationship between concepts.

Exam-style

Remember and understand

Question 12 (1 MARK)

Which of the following is **not** an element of the Aboriginal learning framework?

- A. Story sharing.
- B. Relationships.
- C. Land links.
- D. Community links.

Question 13 (2 MARKS)

Explain a way that systems of knowledge are composed.

Question 14 (3 MARKS)

With reference to an element from the Aboriginal learning framework, suggest how Aboriginal and Torres Strait Islander peoples approach learning.

Apply and analyse

Use the following information to answer questions 15 and 16.

Bindi is a high-school teacher at an Indigenous school in rural Victoria. She wishes to teach her class useful and practical lessons about their culture but is feeling a little stuck. She knows that for Aboriginal and Torres Strait Islander peoples learning is a process that takes place within systems of knowledge, but is unsure what these entail.

Question 15 (1 MARK)

What is meant by systems of knowledge?

Question 16 (6 MARKS)

By consulting with a fellow teacher, Bindi learns that systems of knowledge have developed through many generations and by communities working together to share traditional expertise and knowledge. She also learns that they consist of information that is highly interconnected.

Using examples, explain how Bindi can teach using the relationships through which learning can occur.

Questions from multiple lessons

Question 17 (1 MARK)

Learning the habits of an animal through traditional dances where the movements reflect the patterns of certain animals is an example of which social-cognitive approach to learning?

- A. Classical conditioning.
- B. Operant conditioning.
- C. Observational learning.
- D. Voluntary learning.

Question 18 (3 MARKS)

Coen remembers learning that the symbol of a three-pointed V in Aboriginal artwork represents an emu as there was always an image of an emu's footprint next to artworks that he saw in a museum.

Using the language of classical conditioning, outline the three-phase process of how Coen may have learnt that the symbol of a three-pointed V in Aboriginal artwork represents an emu.

Chapter 4 review

Chapter summary

This chapter outlined different approaches to understanding learning. In this chapter, you learnt that there are many different approaches to understanding learning, including behaviourist approaches to learning, such as classical and operant conditioning, social-cognitive approaches to learning, such as observational learning, and Aboriginal and Torres Strait Islander approaches to learning.

In lesson **4A Classical conditioning**, you learnt about classical conditioning as a three-phase behaviourist approach to learning. In particular, you learnt that classical conditioning involves:

- the phases of before conditioning, during conditioning, and after conditioning
- a neutral stimulus, an unconditioned stimulus and response, and a conditioned stimulus and response.

In lesson **4B Operant conditioning**, you learnt about operant conditioning as another three-phase behaviourist approach to learning. In particular, you learnt that operant conditioning involves:

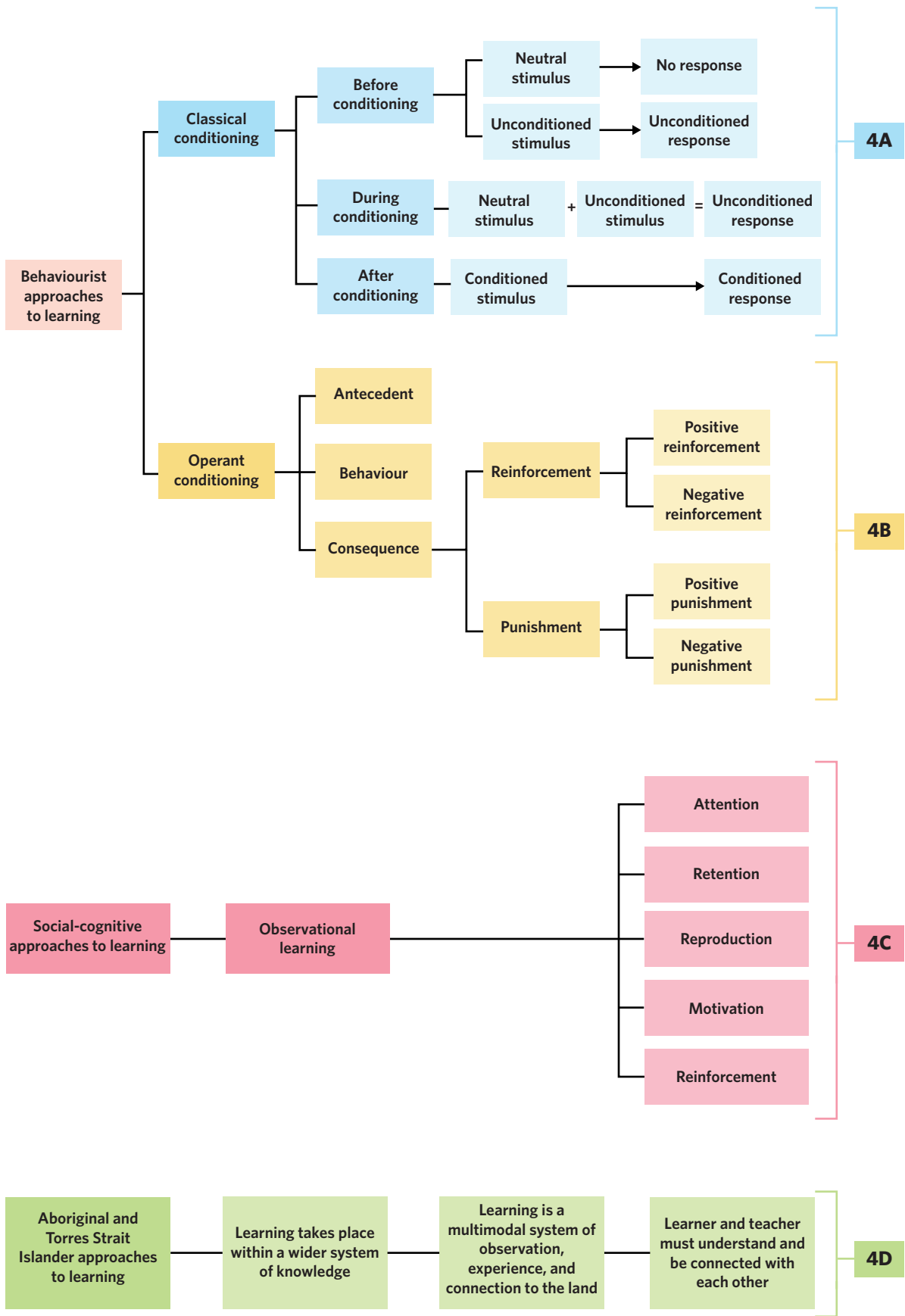
- an antecedent, behaviour, and consequence
- reinforcement (positive or negative), which increases the likelihood that a behaviour reoccurs
- punishment (positive or negative), which decreases the likelihood that a behaviour reoccurs.

In lesson **4C Observational learning**, you learnt about observational learning as a social-cognitive approach to learning. In particular, you learnt that observational learning involves:

- a learner and a model
- the progressive stages of attention, retention, reproduction, motivation, and reinforcement.

In lesson **4D Aboriginal and Torres Strait Islander approaches to learning**, you learnt about Aboriginal and Torres Strait Islander processes of learning. In particular, you learnt about:

- learning as a multimodal system of knowledge
- learning embedded in relationships.



Chapter review activities

Review activity 1: Fill in the table

In chapter 4, you learnt about several approaches to learning. Classical conditioning and operant conditioning (behaviourist approaches), as well as observational learning (a social-cognitive approach), are approaches to learning with several phases and steps. Copy out the tables and fill in the left column with the steps involved in classical conditioning, operant conditioning, and observational learning. Also, fill in the right column with any additional information about each of these phases/stages, such as what occurs and an example.

| | | |
|------------------------|-------|---------|
| Classical conditioning | Phase | Details |
| | | |
| | | |
| | | |

| | | |
|----------------------|-------|---------|
| Operant conditioning | Phase | Details |
| | | |
| | | |
| | | |

| | | |
|------------------------|-------|---------|
| Observational learning | Stage | Details |
| | | |
| | | |
| | | |
| | | |
| | | |

Review activity 2: Fill in the blanks

Fill in the blanks with the following terms:

- conditioned stimulus
- sound of opening the drawer
- classically conditioned
- toy unicorn
- involuntary
- positive reinforcement

Every night, Laura opens a drawer in the living room to bring out a toy unicorn for her dog Tojo. This is Tojo's favourite toy of all, so Tojo instantly starts wagging his tail in excitement when Laura brings it out to him. One night, Laura notices that Tojo starts wagging his tail in excitement in response to the sound of opening the toy drawer alone, before she brings out his favourite toy. Laura realises that Tojo has been _____.

This occurred through the repeated pairing of the _____ (neutral stimulus) with the _____ (unconditioned stimulus), causing Tojo's unconditioned response of excited tail wagging. After conditioning, the sound of opening the drawer became a _____ that elicited the conditioned response of excited tail wagging by itself.

Laura's friend asked her if Tojo could have learnt to wag his tail when the drawer was opened through operant conditioning instead. Her friend argued that Tojo's behaviour was voluntary, whereby the presentation of the toy unicorn was an example of _____, increasing the likelihood that Tojo's excited tail wagging reoccurred. Laura insists, however, that the nature of Tojo's response was _____ and so Tojo must have been classically conditioned.

Chapter 4 test

Multiple choice

Question 1 (1 MARK)

Which of the following is a difference between classical and operant conditioning?

| | Classical conditioning | Operant conditioning |
|----|--|---|
| A. | Involves learning a voluntary behaviour. | Involves learning an involuntary behaviour. |
| B. | Learners are passive. | Learners are active. |
| C. | Involves a kind of consequence. | Does not involve any kind of consequence. |
| D. | Is a behaviourist approach to learning. | Is a social-cognitive approach to learning. |

Question 2 (1 MARK)

In observational learning, what stage does the learner need to have the physical and mental capabilities to replicate a behaviour?

- A. Reinforcement.
- B. Retention.
- C. Attention.
- D. Reproduction.

Question 3 (1 MARK)

A conditioned response first occurs during which stage of classical conditioning?

- A. Pre-conditioning.
- B. Before conditioning.
- C. During conditioning.
- D. After conditioning.

Question 4 (1 MARK)

Susan has been training especially hard at football practice lately. Her coach notices and wants to increase the likelihood that Susan continues to display this amount of effort at training in the future. Therefore, her coach decides to let Susan stop running laps of the oval at the beginning of training, which the whole team hates.

What type of consequence does Susan's coach use to increase the likelihood that Susan continues to display high effort during training?

- A. Positive reinforcement.
- B. Negative reinforcement.
- C. Positive punishment.
- D. Negative punishment.

Question 5 (1 MARK)

Derek has been watching his father cook eggs for breakfast in the morning. He starts paying close attention to what his father is doing. He wants to start returning the favour and cooking breakfast because he knows that this will impress his father.

Derek's desire to please his father by cooking breakfast for him means that he has fulfilled

- A. the motivation stage of observational learning.
- B. the attention stage of observational learning.
- C. during conditioning.
- D. the retention stage of observational learning.

Use the following information to answer questions 6 and 7.

Doctor Diaz wants to determine the effectiveness of positive reinforcement in increasing the likelihood that a behaviour is repeated in the future. Therefore, they set up an experiment with two groups, whereby both groups are asked to exercise for one hour every night over a one-month period. However, only the second group is offered a reward each time they work out in the form of a gift voucher at their nearest supermarket. Doctor Diaz then compared the average amount of sessions that each participant undertook between the groups.

Question 6 (1 MARK)

In this experiment, the second group is the

- A. experimental group.
- B. control group.
- C. confounding variable.
- D. extraneous variable.

Question 7 (1 MARK)

The likely results of the experiment are that

- A. the first group will have the highest average amount of exercise sessions.
- B. the second group will have the highest average amount of exercise sessions.
- C. both groups will have the same average amount of exercise sessions.
- D. neither group will exercise at all.

Short answer

Question 8 (2 MARKS)

Compare attention and retention as stages of observational learning.

Question 9 (3 MARKS)

Identify three differences between classical conditioning and operant conditioning.

Question 10 (5 MARKS)

Cruz is learning how to juggle. He tries to learn by watching online juggling tutorials whereby a professional performer models the motions required in order to juggle successfully. He has been watching these videos every night, desperately hoping that he will be able to enter an upcoming school talent show.

Describe how Cruz could learn to juggle in time for his school talent show, with reference to all stages of observational learning.

Question 11 (6 MARKS)

The 8 ways of Aboriginal learning framework is an example of an Aboriginal and Torres Strait Islander approach to learning.

- a. With reference to the 8 ways of Aboriginal learning framework, explain what is meant by the multimodal nature of Aboriginal and Torres Strait Islander ways of knowing and learning. (2 MARKS)
- b. Do relationships have an important role in Aboriginal and Torres Strait Islander approaches to learning? Justify your response. (4 MARKS)

Question 12 (10 MARKS)

Fabio wants to learn how to bake a cake. He has watched his mother bake lots of cakes in the past but now wants the freedom to be able to bake a cake whenever he wants. Fabio is a student of psychology, so he is aware that there are different approaches that he can use to learn this new skill.

With reference to the scenario, analyse which approaches to learning would most effectively enable Fabio to learn to bake a cake independently.



CHAPTER 5

The psychobiological process of memory

LESSONS

- 5A** Atkinson-Shiffrin multi-store model of memory
- 5B** Brain structures involved in memory
- 5C** The role of episodic and semantic memory in remembering and imagining
- 5D** Mnemonics

KEY KNOWLEDGE

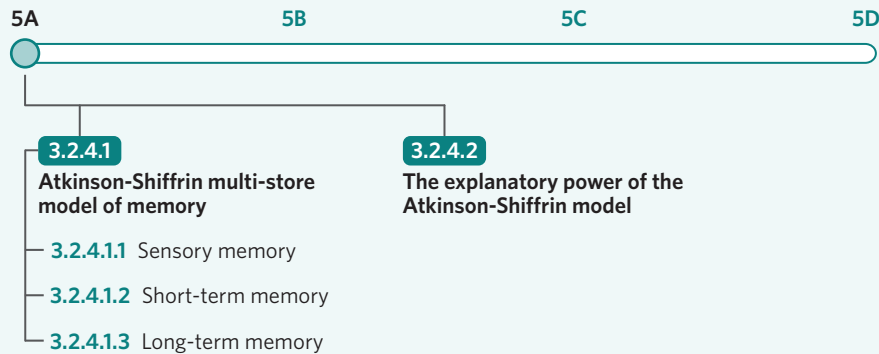
- the explanatory power of the Atkinson-Shiffrin multi-store model of memory in the encoding, storage and retrieval of stored information in sensory, short-term and long-term memory stores
- the roles of the hippocampus, amygdala, neocortex, basal ganglia and cerebellum in long-term implicit and explicit memories
- the role of episodic and semantic memory in retrieving autobiographical events and in constructing possible imagined futures, including evidence from brain imaging and post-mortem studies of brain lesions in people with Alzheimer's disease and aphantasia as an example of individual differences in the experience of mental imagery
- the use of mnemonics (acronyms, acrostics and the method of loci) by written cultures to increase the encoding, storage and retrieval of information as compared with the use of mnemonics such as sung narrative used by oral cultures, including Aboriginal peoples' use of songlines

Image: GoodStudio/Shutterstock.com

5A Atkinson-Shiffrin multi-store model of memory

STUDY DESIGN DOT POINT

- the explanatory power of the Atkinson-Shiffrin multi-store model of memory in the encoding, storage and retrieval of stored information in sensory, short-term and long-term memory stores



Have you ever thought about how your memory works? Why is it that you may only pay attention to and remember selected things in your environment? Do you find it difficult to remember a long list of items, even after you immediately finished reading the list? How come you can only remember certain memories and not others? These questions all relate to the study of memory which is an area of psychology that is constantly being researched and expanded upon.

In this lesson, you will learn about the Atkinson-Shiffrin multi-store model of memory. In particular, you will learn about how the three different memory stores within this model (sensory, short-term, and long-term memory) are involved in the processes of encoding, storing, and retrieving memories.

Atkinson-Shiffrin multi-store model of memory 3.2.4.1

Memories are a central part of our daily lives, but the process of storing and using memories is complex and has been researched by psychologists for over a hundred years. In 1968, Richard Atkinson and Richard Shiffrin presented a model that has been influential in our understanding of memory by considering memory as a system with three distinct stores which interact to encode, store, and retrieve information.

Theory details

Memory is the process of encoding, storing, and retrieving information that has been previously encountered. The **Atkinson-Shiffrin multi-store model of memory** is a model of memory which outlines the three separate stores of memory (sensory, short-term, and long-term) each of which interact through the processes of encoding, storage, and retrieval. Figure 1 provides a visual representation of this model.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Memory the process of encoding, storing, and retrieving information that has been previously encountered

Atkinson-Shiffrin multi-store model of memory a model of memory which outlines the three separate stores of memory (sensory, short-term, and long-term) each of which interact through the processes of encoding, storage, and retrieval

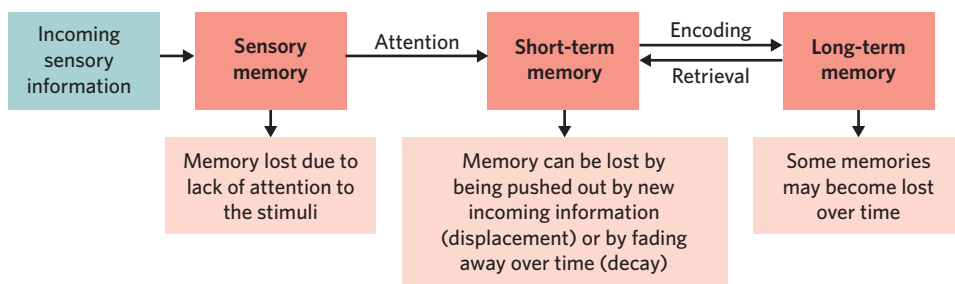


Figure 1 The Atkinson-Shiffrin model of memory

An overview of the processes involved in the Atkinson-Shiffrin model of memory

1. All incoming information enters **sensory memory**; a store of memory which very briefly stores raw information detected by the senses. If this sensory information is attended to, then it is converted into a useable form and transferred to short-term memory.
2. **Short-term memory (STM)** is a store of memory that temporarily stores a limited amount of information that is consciously being attended to and actively manipulated. **Rehearsal** is a controlled process which involves consciously repeating or manipulating information in STM. Rehearsal can increase the likelihood of information being encoded (transferred) into long-term memory.
3. **Encoding** is the process of converting information into a useable form which can be manipulated and stored in the brain. Information from STM is encoded into **long-term memory (LTM)**, which is a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time. Therefore, LTM is the memory store in which relatively permanent **storage** occurs, which refers to the retention of information over time.
4. Information stored in LTM can also be retrieved. **Retrieval** is the process of accessing information that has been stored in long-term memory and bringing it into our conscious awareness in short-term memory.

Sensory memory 3.2.4.1.1

Your senses are constantly receiving input from the environment. Right now, you might be in your classroom, reading these words. However, you might also be receiving auditory information from the noise around you. Hopefully you are paying attention to the words on this page, rather than the chatter around you, so that the words in this lesson can be transferred from your sensory memory to your other memory stores.

Sensory memory is a store of memory which very briefly stores raw information detected by the senses. As such, sensory memory can be described as the entry point for memory, as all information which is later stored must first be detected by the senses. At this stage, this information is an exact replica of that which is in your environment, meaning that it has not yet undergone the process of being encoded.

Examples of the type of information that can be retained by sensory memory include:

- the faces of your classmates directly after looking at them
- the sound of a bird chirping outside just after you hear it
- the tag of your clothing that you might feel rubbing against your skin
- the scent of your deodorant when you spray it
- the taste of your food when you are eating lunch.

Our sensory memory store has an unlimited capacity, meaning that there is no limit to how much it can hold. The duration of sensory memory, however, is extremely brief and generally varies between 0.2 to 4 seconds. Therefore, while our senses can hold a fairly unlimited amount of information, we do not pay attention to all this information. Only information that is attended to is transferred to short-term memory for processing. If sensory memory is not attended to, then it is completely lost.

Sensory memory

a store of memory which very briefly stores raw information detected by the senses

Short-term memory (STM)

a store of memory that temporarily stores a limited amount of information that is consciously being attended to and actively manipulated

Rehearsal a controlled process which involves consciously repeating or manipulating information in short-term memory

Encoding the process of converting information into a useable form which can be manipulated and stored in the brain

Long-term memory (LTM)

a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time

Storage the retention of information over time

Retrieval the process of accessing information, that has been stored in long-term memory, and bringing it into our conscious awareness in short-term memory

WANT TO KNOW MORE?

It is assumed that there are different subtypes of sensory memory that process stimuli from each of your five senses. However, only three subtypes have been studied extensively. These include:

- Iconic memory (visual information)
- Echoic memory (auditory information)
- Haptic memory (information specific to physical touch)

The different types of sensory memory have different durations. Iconic memory has a duration of 0.2 to 0.4 seconds, echoic memory has a duration of 3 to 4 seconds and haptic memory is believed to have a duration of fewer than 2 seconds.

Short-term memory 3.2.4.1.2

Have you ever read a sentence and then had to go back and read it immediately after because you forgot what it said? Do you find it hard to remember a long list of grocery items? Do you try to remember information by repeating it over and over again in your head? These questions relate to our short-term memory store.

Short-term memory (STM) is a store of memory that holds a limited amount of information that is consciously being attended to and actively manipulated. The information in your STM can come both from your sensory or long-term memory. Information from your sensory memory, which you have paid attention to will move into your STM. Similarly, information from your long-term memory that you retrieve can also move to your conscious awareness, and hence exist within your STM.

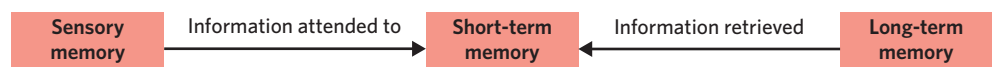


Figure 2 Short-term memory can come from information that has been attended to from sensory memory or retrieved from long-term memory

STM is also known as ‘working memory’ because you are aware of all the information that you hold in this memory store and are consciously manipulating (‘working on’) it. STM has a limited capacity of 7 ± 2 items (or 5 to 9 items). This is the number of items that can be actively ‘worked on’ at any one time. The duration of STM is 18 to 30 seconds for most people. More specifically, it is believed that information generally begins to fade after approximately 18 to 20 seconds, however, it is possible for some information to remain in STM for up to 30 seconds.

Manipulating information may involve updating, adding, or changing the information in some way. It also involves the process of rehearsal. Individuals can rehearse information by repeating it or by linking it to other pieces of information that were previously learnt. Rehearsal helps encode information from STM into long-term memory where it can be stored.

If the information in your short-term memory is not processed and encoded in long-term memory, it can be pushed out by new incoming information (which is known as displacement) or fade away on its own after the duration of STM has expired (which is known as decay).

WANT TO KNOW MORE?

Your STM can be manipulated in ways that can potentially increase the capacity and duration of STM and improve your ability to remember information. These processes include chunking, maintenance rehearsal, and elaborative rehearsal.

| Chunking | Maintenance rehearsal | Elaborative rehearsal |
|--|---|--|
| <ul style="list-style-type: none"> • ‘Chunking’ is a process by which you can group smaller ‘chunks’ of information into larger ‘chunks’ in order to hold more information in STM. • An example of this is remembering a mobile number, which has 10 numbers and therefore exceeds most people’s STM capacity, by ‘chunking’ their mobile number into 3 chunks of 3–4 digits, making it easier to work with. | <ul style="list-style-type: none"> • Maintenance rehearsal involves repeating new information over and over again to keep the information in STM for as long as possible. • For example, by repeating a phone number over and over again you could remember it for as long as you are able to rehearse the information. Each rehearsal refreshes the 18–30 second duration that the information can be stored in STM. | <ul style="list-style-type: none"> • Elaborative rehearsal involves meaningfully linking new information to information already stored in long-term memory. • For example, you could remember the name of a new co-worker by relating their name to somebody else you know, such as a family member. Therefore, when you see them again, you may be easily able to retrieve their name because of this connection. |

You should try some of these techniques when studying for your psychology exam to help you remember information!

Long-term memory 3.2.4.1.3

Your brain has the capacity to hold a potentially unlimited amount of information. Think about your first day of school, your parents' names, or even what you did last night. All these memories are stored in your long-term memory where they can be retrieved and brought into conscious awareness.

Long-term memory (LTM) is a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time. It contains all the information you retain from past events, as well as your knowledge of facts. These memories have undergone the process of being encoded from STM, and exist in a useable form. This information is further processed into different types of LTM and organised in different parts of the brain (which will be explored in future lessons). This information in LTM can be retrieved and brought into short-term memory.

The capacity of LTM is described as being potentially unlimited. Information stored in LTM is not in conscious awareness. However, whilst LTM is considered to have a potentially unlimited amount of information, this does not mean that we have the capacity to retrieve all this information. Sometimes, we are unable to retrieve and access information in LTM as we may be unaware of how to retrieve it or are not prompted by the right retrieval cues.

The duration of LTM is understood as being relatively permanent, meaning that theoretically information can be stored in LTM forever. However, research on this matter is still being conducted.

USEFUL TIP

When answering a short answer question about short-term or long-term memory, you can only use the acronyms STM and LTM if you introduce the term in full and enclose the acronyms in a bracket the first time you mention it. E.g. Long-term memory (LTM) is a memory store...

Don't forget to do this in every answer!

The explanatory power of the Atkinson-Shiffrin model 3.2.4.2

The Atkinson-Shiffrin multi-store model of memory is an influential model in explaining the process of memory. Nevertheless, as with any model, it does not always accurately reflect the full complexity and experience of the phenomenon. Therefore, familiarising yourself with some of the model's strengths and limitations will help you to consolidate your understanding of the model as a whole and to develop your critical thinking skills.

Theory details

The Atkinson-Shiffrin model successfully explains the three distinct stores involved in memory and how they interact with each other through encoding, storage, and retrieval. Memory experiments and case studies of patients with amnesia enhance the explanatory power of the model by providing evidence for the distinction between STM and LTM. Despite these strengths, as with all models outlining psychological concepts, the Atkinson-Shiffrin multi-store model of memory also has its limitations. These are outlined in table 1.

Table 1 Strengths and limitations of the Atkinson-Shiffrin model of memory

| Strengths | Limitations |
|--|---|
| <ul style="list-style-type: none"> The model distinguishes between the different stores involved in memory. The model outlines that each memory store has a different capacity and duration. The model provides a good understanding of the structure and process of memory. Findings from memory studies support the distinction between STM and LTM outlined in the model. The model can help explain why amnesia patients may have difficulty retrieving memories from LTM or encoding information from STM to LTM. | <ul style="list-style-type: none"> The Atkinson-Shiffrin multi-store model of memory may be considered to be oversimplified. STM is more complex than the model suggests. Baddeley and Hitch (1974) propose that STM is not just a singular store but rather encompasses different components within it. The model ignores factors, such as motivation and strategy, which can facilitate learning and assist in encoding information from STM to LTM. Initially, the model proposed that rehearsal was necessary for information to be transferred into LTM. However, studies show that transferring information into LTM can occur without rehearsal. The model does not account for individual differences in memory processes, storage duration, and capacity. |

Theory summary

In this lesson, you learnt about the Atkinson-Shiffrin multi-store model of memory. In particular, you learnt about how the different stores; sensory memory, short-term, and long-term memory, are involved in the encoding, storage, and retrieval of information. You also learnt about the strengths and limitations of this model.

5A Questions

Theory review

Question 1

Which of the following are involved in the Atkinson-Shiffrin multi-store model of memory?

(Select all that apply)

- I. Encoding.
 - II. Acquiring.
 - III. Storage.
 - IV. Retrieval.
 - V. Reinforcement.
-

Question 2

Which of the following is the first memory store?

- A. Short-term memory.
 - B. Sensory memory.
 - C. Long-term memory.
-

Question 3

Sensory memory consists of information that has been manipulated and worked on.

- A. True.
 - B. False.
-

Question 4

Short-term memory is also known as working memory.

- A. True.
 - B. False.
-

Question 5

Long-term memories cannot be transferred to short-term memory.

- A. True.
 - B. False.
-

Question 6

The Atkinson-Shiffrin multi-store model of memory is a perfect model of memory as it outlines the three distinct memory stores.

- A. True.
 - B. False.
-

Assessment skills

Perfect your phrasing

Question 7

Which of the following sentences is most correct?

- A. Encoding is the process of **converting** information into a useable form which can be stored in the brain.
- B. Encoding is the process of **modifying** information to a useable form which can be stored in the brain.

Question 8

Which of the following sentences is most correct?

- A. Long-term memory is a store of memory in which an **unlimited** amount of information is stored for a **permanent** amount of time.
- B. Long-term memory is a store of memory in which a **potentially unlimited** amount of information is stored for a **relatively permanent** amount of time.

Data analysis

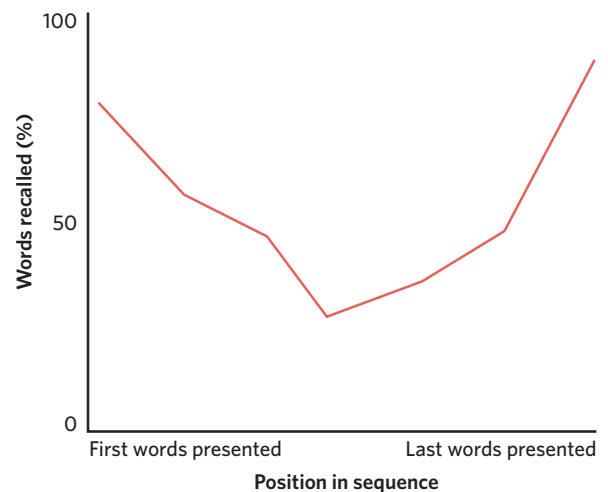
The following assessment skills type reflects the study design assessment dot point:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 9 and 10.

Dr Bruno wanted to investigate how individuals remember a list of words. Specifically, he wanted to see if the order in which the words are presented in a list impacts the words remembered. In order to test this, a group of adults was given a list of 20 words to study and was immediately tested on their ability to recall the list of 20 words.

In accordance with the Atkinson-Shiffrin model of memory, Dr Bruno hypothesised that the adults would have a higher recall of words at the beginning and end of the list in comparison to words in the middle. This is because Dr Bruno believed that words at the beginning of the list would be remembered as they have had enough time to be rehearsed and encoded from short-term memory to long-term memory. He also believed that words from the middle of the list are presented too late to be rehearsed and transferred to LTM and too early to remain in STM at the time of retrieval. Furthermore, he believed that items at the end of the list would be remembered as they are still in short-term memory at the time of recall.

**Question 9**

Which of the following statements regarding Dr Bruno's hypothesis is most correct?

- A. Dr Bruno's hypothesis was supported as the percentage of words recalled was highest for words at the beginning and end of the list, and lowest for words in the middle.
- B. Dr Bruno's hypothesis was proven correct as the percentage of words recalled was really good for words at the beginning and end of the list, and really bad for words in the middle.
- C. Dr Bruno's hypothesis was not supported as the percentage of words recalled was highest for words at the beginning and end of the list, and lowest for words in the middle.
- D. Dr Bruno's hypothesis was supported as the percentage of words recalled was lowest for words at the beginning and end of the list, and highest for words in the middle.

Question 10

How might this study enhance the explanatory power of the Atkinson-Shiffrin model of memory?

- A. This study may enhance the explanatory power of the Atkinson-Shiffrin model by providing evidence for the complexity of short-term memory and its different components.
- B. This study may enhance the explanatory power of the Atkinson-Shiffrin model by providing evidence for the distinction between long-term and short-term memory stores.
- C. This study may enhance the explanatory power of the Atkinson-Shiffrin model by providing evidence for sensory memory.
- D. This study may enhance the explanatory power of the Atkinson-Shiffrin model by providing evidence for why amnesiac patients may have difficulty retrieving memories.

Exam-style

Remember and understand

Question 11 (1 MARK)

Which of the following is the correct sequence of memory stores involved in forming a new memory as described by the Atkinson-Shiffrin model of memory?

- A. Long-term memory, sensory memory, short-term memory.
- B. Sensory memory, echoic memory, long-term memory.
- C. Sensory memory, short-term memory, long-term memory.
- D. Short-term memory, long-term memory, iconic memory.

Adapted from VCAA Psychology exam 2012 Q18

Question 12 (1 MARK)

Retrieval is the process of

- A. accessing information, which has been stored in long-term memory, and bringing it into our conscious awareness in short-term memory.
- B. accessing information, which has been stored in sensory memory, and bringing it into our conscious awareness in short-term memory.
- C. accessing information, which has been stored in long-term memory, and bringing it into our conscious awareness in sensory memory.
- D. accessing information, which has been stored in short-term memory, and bringing it into our conscious awareness in long-term memory.

Question 13 (1 MARK)

Which of the following statements about memory is correct?

- A. The duration of short-term memory is five to nine seconds.
- B. The capacity of short-term memory can be increased by rehearsal.
- C. Short-term memory receives information from both sensory memory and long-term memory.
- D. In short-term memory, information is an exact replica of its original form.

Adapted from VCAA Psychology exam 2020 Q22

Question 14 (2 MARKS)

Outline how information from sensory memory is transferred to short-term memory.

Apply and analyse

Use the following information to answer questions 15 and 16.

Faye's dad asked her to pick up the groceries on her way home from work. She quickly glanced at the list which included three items before running into the shop to grab them. While running to the shop, she consciously repeated the list in her mind. When she arrived at the shop, she immediately spotted the first item on her list.

Question 15 (1 MARK)

According to the Atkinson-Shiffrin model, which of the memory stores was involved when Faye initially saw the first item on her list?

- A. Working memory.
- B. Sensory memory.
- C. Short-term memory.
- D. Long-term memory.

Question 16 (1 MARK)

According to the Atkinson-Shiffrin model, which of the memory stores was involved when Faye was consciously repeating the list in her mind?

- A. Encoded memory.
- B. Sensory memory.
- C. Short-term memory.
- D. Long-term memory.

Question 17 (2 MARKS)

Aristotle was having a conversation with his school friend, Plato, about their experiences together at primary school, which they attended more than 10 years earlier. While talking, he remembered a funny story from year four and started to tell the story.

Identify and explain the process of memory which is involved in Aristotle remembering and telling his story from primary school.

Question 18 (4 MARKS)

Shayla is a year six student who has been learning her times tables. To help her remember her time tables for an upcoming quiz, Shayla has been listening to a voice recording which reads out time tables. After she listens to the voice recording, she repeats the information to herself over and over again.

Discuss how the relevant stores of memory are involved in Shayla storing information about time tables.

Adapted from VCAA Psychology exam 2017 Q11

Question 19 (7 MARKS)

Caterina wanted to investigate whether listening to classical music enhanced the ability of high school students to recall information. As part of her VCE Psychology practical investigation, she decided to use 30 of her friends in her experiment. She randomly allocated her friends to either the control group, who did not listen to music while they read a list of word pairings, or the experimental group, who listened to classical music while reading a list of word pairings.

All participants had the opportunity to read the words for five minutes while either listening or not listening to music. After this, they were asked to verbally recall as many of the word pairings as they could remember. The number of word pairings they could recall was then recorded.

Adapted from VCAA Psychology exam 2017 Q7

- a. Identify whether the data Caterina collected was quantitative or qualitative. (1 MARK)
- b. Identify the independent and dependent variable in Caterina's research investigation. (2 MARKS)
- c. Explain whether the results of Caterina's study could be generalised to the population of high school students. Justify your response. (2 MARKS)
- d. Identify the memory store that is the entry point of the music and the memory store involved in verbally recalling the word pairings. (2 MARKS)

Evaluate

Question 20 (3 MARKS)

Evaluate the explanatory power of Atkinson-Shiffrin multi-store model of memory.

Questions from multiple lessons

Use the following information for questions 21 and 22.

Johnnie was recently in a car crash. Even though the crash occurred three weeks earlier, he is still able to remember vivid details of the crash, including that the driver of the car who crashed into them was wearing a purple jacket with small sunflowers on it. After the crash, Johnnie was quite shaken up and has been scared to get in a car ever since.

Question 21 (1 MARK)

Johnnie's ability to remember vivid details from the scene of the crash is due to

- A. the process of sensory memory, which involves storing memory for future use.
 - B. the process of long-term memory, which involves paying attention to certain stimuli in your environment and processing this information for future retrieval.
 - C. the store of long-term memory, which contains information which has been encoded into a useable form and stored for future use.
 - D. the store of long-term memory, which involves paying attention to certain stimuli in your environment and processing this information.
-

Question 22 (1 MARK)

Johnnie's fear of now getting into cars is due to

- A. the creation of an association due to observational learning.
 - B. the process of classical conditioning as the car is the UCS.
 - C. the process of operant conditioning as the car crash was the antecedent.
 - D. the creation of an association due to classical conditioning.
-

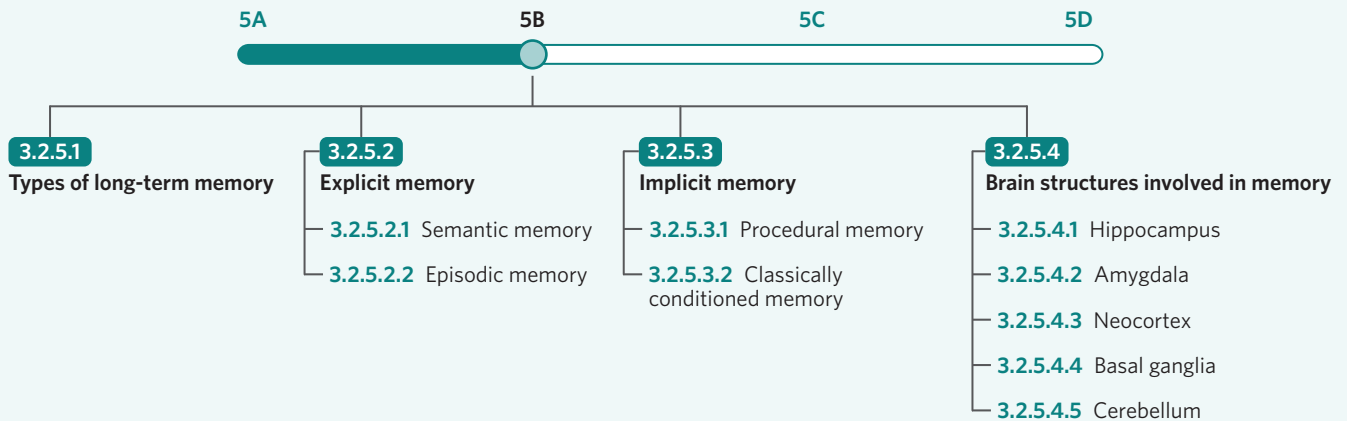
Question 23 (4 MARKS)

Explain how long-term depression may impact the information stored in long-term memory.

5B Brain structures involved in memory

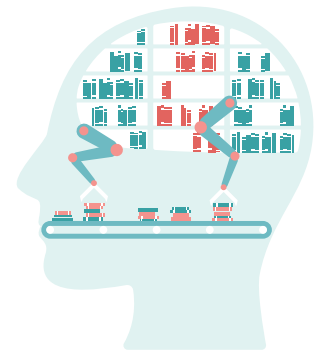
STUDY DESIGN DOT POINT

- the roles of the hippocampus, amygdala, neocortex, basal ganglia and cerebellum in long-term implicit and explicit memories



Your brain is a massive processing and storage unit for new information, such as what your friend texted you, new facts you learnt at school, how to play a new song on a guitar, or your recent scary encounter with a snake. These memories are constantly being processed and stored in different parts of your brain for later use.

In this lesson, you will learn about the different types of long-term memory: implicit and explicit memory. You will also learn about how different brain structures are involved in the encoding and storage of these memories. In particular, you will learn about the roles of the hippocampus, amygdala, neocortex, basal ganglia, and cerebellum.



Types of long-term memory 3.2.5.1

Our long-term memory is integral to who we are. It consists of countless memories and experiences, as well as an incredible amount of information, that enables us to go through the motions of our everyday lives. In this section of the lesson, you will be introduced to the different types of long-term memory.

Theory details

Long-term memory (LTM) is a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time.

Long-term memory can be categorised into two types: implicit and explicit memory. It is important to understand the difference between these two types of memory, as well as the further types of memory that fall within these two types. This includes semantic and episodic memory as types of explicit memory, and procedural and classically conditioned memory as types of implicit memory.

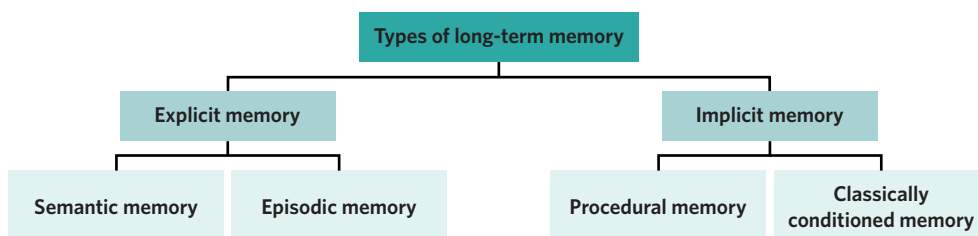


Figure 1 Different types of long-term memory

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Long-term memory (LTM) a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time

USEFUL TIP

To help you remember the meaning of explicit memory, you can remember that you can **EX**plain **EX**PLICIT memory, or **DE**clare it because they are **DE**clarative.

Explicit memory (also known as declarative memory) a type of long-term memory that is consciously retrieved

Semantic memory a type of explicit memory that consists of general knowledge or facts

Episodic memory a type of explicit memory that consists of personal experiences or events

USEFUL TIP

A helpful way to remember episodic memory is that each episodic memory is an episode of your life, with all of these life events forming a series of episodes that capture your personal life journey.

Implicit memory a type of long-term memory that is unconsciously retrieved

Explicit memory 3.2.5.2

Can you name all the states in Australia? Do you remember how many there are? What memories do you have from a family holiday or a concert you attended? These examples relate to explicit memory, which will be explored in this section of the lesson.

Theory details

Explicit memory (also known as declarative memory) is a type of long-term memory that is consciously retrieved. These memories can be voluntarily retrieved from long-term memory and brought into conscious awareness. Explicit memories are also known as declarative memories, meaning they can be declared or stated to someone else. This may involve you remembering that you had vegetable spring rolls for lunch and telling your friend about how delicious they were. The ability for you to verbally describe the type of spring roll, how it tasted, and where you ate it demonstrates that it is an explicit memory.

Within explicit memory, there are two different types of memory you need to learn. These are semantic and episodic memory, which are explained in table 1.

Table 1 Semantic and episodic memory are types of explicit memory

| Type of explicit memory | What is it? | Examples |
|----------------------------------|--|--|
| Semantic memory 3.2.5.2.1 | <ul style="list-style-type: none"> Semantic memory is a type of explicit memory that consists of general knowledge or facts. These memories are declarative in that they can be verbally explained to others. | Knowing that: <ul style="list-style-type: none"> there are seven continents dogs bark, while cats meow three multiplied by three equals nine. |
| Episodic memory 3.2.5.2.2 | <ul style="list-style-type: none"> Episodic memory is a type of explicit memory that consists of personal experiences or events. These memories are unique to each individual and their own personal experiences. | The memory of: <ul style="list-style-type: none"> getting your driver's licence details from when you went on holiday what you ate for dinner last night. |

Implicit memory 3.2.5.3

Do you know how to ride a bike? Can you remember the steps to a dance you learnt as a child? Do you feel scared every time you see a spider due to previous encounters with spiders? These examples relate to implicit memory, which will be explored in this section of the lesson.

Theory details

Implicit memory is a type of long-term memory that is unconsciously retrieved. These memories are involuntarily retrieved, such as recalling the technique of how to kick a soccer ball during a match or recalling how scared you were after seeing an aggressive dog. When you retrieve these memories, the memory of how to perform a soccer technique is demonstrated by the ability to execute the technique, not by the ability to explain the technique. Additionally, the fear of the dog is retrieved without conscious effort in the presence of dogs. Furthermore, the emotional component of declarative memories is also a type of implicit memory as the emotion is retrieved unconsciously.

There are two different types of implicit memory that you need to learn. These are procedural and classically conditioned memory, which are explained in table 2.

Table 2 Procedural and classically conditioned memory are types of implicit memory

| Type of implicit memory | What is it? | Examples |
|---|---|---|
| Procedural memory 3.2.5.3.1 | <ul style="list-style-type: none"> • Procedural memory is a type of implicit memory that involves knowing how to carry out tasks that are facilitated by motor skills. | Knowing how to: <ul style="list-style-type: none"> • tie your shoelaces • kick a ball • play the guitar. |
| Classically conditioned memory 3.2.5.3.2 | <ul style="list-style-type: none"> • Classically conditioned memory is a type of implicit memory that involves an involuntary response, such as fear, to a stimulus which has repeatedly been associated with an emotionally-arousing stimulus. This response is usually emotionally charged, commonly involving strong feelings, such as fear, disgust, or elation. • Classically conditioned memories are retrieved involuntarily (without conscious effort) and can be reflexive. • Classically conditioned memories may involve the formation of an involuntary fear response to a particular stimulus after it has been repeatedly associated with another fear-inducing stimulus. • Classically conditioned memories may also involve the formation of an involuntary habit, such as biting your nails when you confront a nerve-racking situation or automatically pressing down on the brake when you reach a stop sign. | Imagine that an individual was swimming in the ocean as a child when they got caught in rough surf and were repeatedly dumped by waves. This may form a fearful memory due to classical conditioning. The association between the ocean and this frightening experience, in which the individual was extremely scared, may cause them to have an involuntary fear response whenever they see the ocean. This individual is likely to respond reflexively (due to the memory being implicit and involuntary) and be unaware that they are activating this conditioned fear response. |

Procedural memory

a type of implicit memory that involves knowing how to carry out tasks that are facilitated by motor skills

Classically conditioned memory

a type of implicit memory that involves an involuntary response, such as fear, to a stimulus which has repeatedly been associated with an emotionally-arousing stimulus

USEFUL TIP

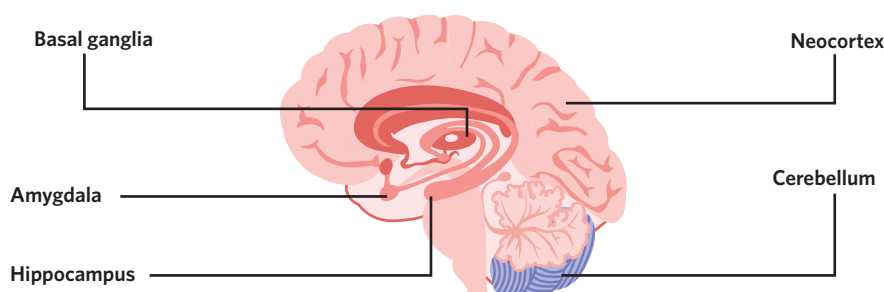
It is important to be able to distinguish between declarative and procedural memories. It is helpful to remember that declarative memories often involve 'knowing that', such as 'I know that Christmas day is the 25th of December'. By contrast, procedural memories often involve 'knowing how', such as 'I know how to tie my shoelaces'.

Brain structures involved in memory 3.2.5.4

Memory is not a single process that occurs in one region of the brain. Rather, memory is a complex process that requires the involvement of and interaction between various brain structures.

Theory details

There are multiple structures within the brain that are involved in the process of memory, and more specifically in the encoding and storage of long-term memories. These brain structures include the hippocampus, amygdala, neocortex, basal ganglia, and cerebellum. These brain structures interact to encode and store long-term memories.

**Figure 2** Brain structures involved in the storage of long-term memories

LESSON LINK

In lesson **5A Atkinson-Shiffrin multi-store model of memory**, you learnt about the Atkinson-Shiffrin model of memory. Specifically, you learnt about the processes of encoding and storage. Encoding is the process of converting information into a usable form that can be manipulated and stored in the brain. Encoding can involve transferring information from short-term memory to long-term memory. By contrast, storage is the retention of information over time. In this lesson, the brain structures that are involved in memory will be discussed in terms of their roles in encoding information from short-term to long-term memory and storing different types of memories.

Hippocampus (in relation to memory) a brain structure that is primarily involved in encoding explicit memories

Amygdala (in relation to memory) a brain structure that is primarily involved in encoding the emotional components of memories

Neocortex (in relation to memory) a brain structure that stores explicit memories

Hippocampus 3.2.5.4.1

The **hippocampus** (in relation to memory) is a brain structure that is primarily involved in encoding explicit memories. The hippocampus is located in the middle of the brain. People who have damage to the hippocampus may experience difficulty forming new explicit memories due to the hippocampus' role in encoding these memories.

Amygdala 3.2.5.4.2

The **amygdala** (in relation to memory) is a brain structure that is primarily involved in encoding the emotional component of memories. The amygdala is also located in the middle of the brain and is often described as the 'fear centre' of the brain. This brain structure is responsible for encoding the emotional components of classically conditioned and explicit memories. It is involved in strengthening the encoding of emotional components of memories, contributing to them being encoded in greater detail.

Once the amygdala detects an experience that is emotionally arousing, it encodes this emotional aspect of the memory. For this reason, the amygdala can be thought of as helping label the emotional components of memory. When this is combined with the explicit memory encoded by the hippocampus, the strength of the memory is enhanced. Therefore, the amygdala helps encode classically conditioned memories that involve distinct emotional responses, such as fear, disgust, anger, or excitement, which are often our strongest memories.

LESSON LINK

In lesson, **3A Stress**, you learnt about the role of adrenaline in the flight-or-fight-or-freeze response. When you are confronted with an emotionally arousing experience, adrenaline is released from the adrenal glands, activating sympathetic nervous system responses. Furthermore, the release of adrenaline prompts the release of noradrenaline in the amygdala. This activates the amygdala to signal to the hippocampus that the experience is emotionally significant, strengthening the encoding of the memory. This may explain why you tend to remember memories in which you felt very strong emotions, such as excitement or fear, as opposed to ordinary everyday memories.

Neocortex 3.2.5.4.3

The **neocortex** (in relation to memory) is a brain structure that stores explicit memories. The neocortex consists of six layers and is part of the cerebral cortex. Once episodic and semantic memories are converted into a usable form in the hippocampus, they are stored within the neocortex to be retrieved for later use. The neocortex covers most of the brain's surface and consists of four lobes, with memories being stored in particular locations depending on the type of memory and where it was processed. For example, the memory of a song's melody may be partially stored in the auditory cortex, which is the part of the neocortex involved in storing some aspects of auditory information. However, other aspects of the melody may be stored in other brain regions because the brain regions are not isolated and interact to store memories. Nevertheless, research suggests that the frontal and temporal lobes are the main lobes involved in the storage of semantic and episodic memories (Graham et al., 1997).

Due to long-term memories being stored in various locations within the neocortex, neural connections are able to be formed between different memories. These links between memories attach meaning to them and enhance your understanding of how different concepts and memories are interrelated.

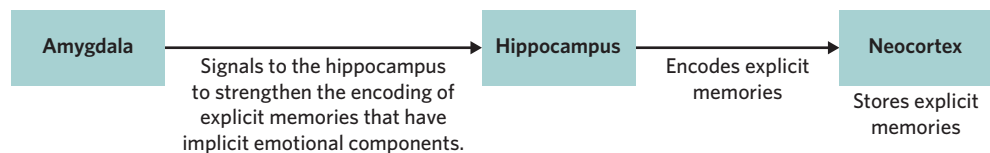


Figure 3 The interaction between the hippocampus, amygdala, and neocortex in memory

Furthermore, there is emerging evidence that motor programming regions of the neocortex, such as the premotor cortex and primary motor cortex in the frontal lobe, may have a role in encoding, storing, and retrieving implicit procedural memories that involve executing motor movements.

Basal ganglia 3.2.5.4.4

The **basal ganglia** (in relation to memory) are a group of brain structures involved in encoding and storing implicit memories, specifically those related to habit formation, procedural sequences of movements, and reward pathways.

Located deep within the centre of the brain, the basal ganglia has various roles in memory:

- The basal ganglia encodes and stores memories that are unconsciously retrieved, such as those related to habit formation.
- The basal ganglia encodes and stores memories related to reward processing, supporting learning that is driven by feedback.
- The basal ganglia encodes and stores procedural memories related to motor skills and sequential movements through its connection with the cerebellum (Radhakrishnan et al., 2023).

Cerebellum 3.2.4.5.5

The **cerebellum** (in relation to memory) is a brain structure involved in encoding and storing implicit memories, specifically those related to unconscious habits, simple reflexes, or procedural sequences of precise movements.

Located at the base of the brain, the cerebellum has various roles in memory:

- The cerebellum encodes and stores procedural memories. In particular, due to its role in motor control and coordination, as well as the maintenance of balance and posture, the cerebellum enables precise fine motor movements (The University of Queensland, n.d.).
- The cerebellum encodes and stores memories of behavioural responses that have been acquired through classical conditioning (Thompson & Steinmetz, 2009). This includes memories of classically conditioned simple reflexes.

Furthermore, it is important to understand that the cerebellum and basal ganglia are not distinct brain structures. They instead interact with one another, as well as motor programming regions of the neocortex, to encode, store, and retrieve implicit long-term memories, including those associated with procedural movements (VCAA, 2023).

USEFUL TIP

When writing a response on the interaction between brain structures, it is extremely important to pay close attention to the given scenario. As an example of this need to read closely, look at this question from the VCAA 2017 Psychology exam:

Arlo is a keen basketballer who plays on indoor and outdoor courts. During an indoor grand final, she fell over and twisted her knee. Her team also lost the game. Now, whenever Arlo plays on an indoor court, she becomes emotional.

The brain area that is responsible for the storage of Arlo's implicit memory of how to play basketball is the

- cerebral cortex.
- hippocampus.
- cerebellum.
- amygdala.

Reproduced from VCAA 2017 Psychology exam MCQ 27

The correct option is C, the cerebellum. Many students answered this question incorrectly, with only 46% of students choosing the correct answer. The cerebellum is correct due to the question referring to Arlo's memory of how to play (a procedural memory) rather than the emotional component of the scenario. Procedural memories are stored via connections between the cerebellum and other brain structures. Therefore, option C is correct. This demonstrates the importance of paying attention to the parts of the scenario that the question addresses and not to get distracted by other irrelevant information.

Basal ganglia (in relation to memory) a brain structure involved in encoding and storing implicit memories, specifically those related to habit formation, procedural sequences of movements, and reward pathways

Cerebellum (in relation to memory) a brain structure involved in encoding and storing implicit memories, specifically those related to unconscious habits, simple reflexes, or procedural sequences of precise movements

USEFUL TIP

It is important to recognise that the neural mechanisms underlying memory are under continual investigation. Despite previous research contributing to our current knowledge, the roles and relationships of the brain in memory are not yet completely understood. New research is constantly emerging that furthers our understanding of memory as a complex and interactive system.

Theory summary

In this lesson, you learnt about the two categories of long-term memory: implicit and explicit memory. Additionally, you have learnt that there are further types of memory within each category of long-term memory. You have also learnt about the brain structures involved in encoding and storing these memories, including the hippocampus, amygdala, neocortex, basal ganglia, and cerebellum.

5B Questions

Theory review

Question 1

Long-term memory involves only one type of memory.

- A. True.
- B. False.

Question 2

Explicit memory is also known as

- A. non-declarative memory.
- B. declarative memory.
- C. conscious memory.

Question 3

Explicit memory consists of _____ and _____ memory.

Which of the following best fills in the blanks?

- A. semantic; episodic
- B. procedural; classically conditioned

Question 4

You do not need to think about retrieving procedural and classically conditioned memories.

- A. True.
- B. False.

Question 5

The neocortex encodes and stores all explicit and implicit memories.

- A. True.
- B. False.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Use the following information to answer questions 6-10.

H.M. suffered from severe epileptic seizures that impacted his ability to work and have a normal life. In order to reduce the severity of these seizures, H.M. underwent an experimental procedure involving the surgical removal of his hippocampus. Although the seizures decreased in severity, observations of H.M. revealed other side effects. While his short-term memory remained intact, he was unable to transfer any of this information to long-term memory. For example, although H.M. would meet new people following his surgery, he would never be able to remember them and would act as though he has never met them before when he saw them again. Despite this, H.M. remembered scenes from his childhood and some historical events that occurred before his surgery. He was also able to form new procedural memories.

(Scoville & Milner, 1957)

L.P. suffered an attack of encephalitis in her early forties. Following the attack, L.P. found she had difficulty recognizing familiar faces, remembering the meaning of words, recalling facts about famous people, and finding items in her familiar grocery store. Despite this, she was still able to form new episodic memories and complete tasks, such as sewing and driving.

(De Renzi et al., 1987)

Question 6

Which of the following statements best reflects how the removal of the hippocampus impacted H.M.'s memory?

- A. 'While his short-term memory remained intact, he was unable to transfer any of this information to long-term memory.'
- B. 'H.M. remembered scenes from his childhood and some historical events that occurred before his surgery.'

Question 7

Which of the following statements best reflects how L.P.'s explicit memory was affected by the attack of encephalitis?

- A. 'L.P. found she had difficulty recognizing familiar faces, remembering the meaning of words, recalling facts about famous people, and finding items in her familiar grocery store.'
- B. 'She was still able to form new episodic memories and complete tasks, such as sewing and driving.'

Question 8

L.P.'s semantic memory was impaired following her attack of encephalitis. Which of the following statements best reflects which structure of her brain was impacted by the attack?

- A. L.P. may have experienced damage to her neocortex as her semantic memory was impaired.
- B. L.P. may have experienced damage to her cerebellum as her semantic memory was impaired.
- C. L.P. may have experienced damage to her basal ganglia as her semantic memory was impaired.

Question 9

H.M. was unable to form any new long-term memories while L.P. was able to form new episodic memories. This statement suggests that

- A. L.P. experienced damage to her hippocampus.
- B. L.P. experienced damage to her neocortex.
- C. L.P. did not experience damage to her hippocampus.

Question 10

L.P. was able to complete tasks, such as sewing and driving. Is it likely that H.M. was able to complete the same tasks?

- A. H.M. was likely unable to complete the same tasks as his hippocampus was removed, which is the area of the brain responsible for encoding and storing procedural memories.
- B. H.M. was likely able to complete the same tasks as his cerebellum was not removed, which is the area of the brain responsible for encoding and storing procedural memories.

Exam-style

Remember and understand

Question 11 (1 MARK)

Which type of long-term memory involves knowing that 'the sky is blue', 'the English alphabet has 26 letters', and ' $8 - 2 = 6$ '?

- A. Episodic memory.
- B. Implicit memory.
- C. Procedural memory.
- D. Semantic memory.

Adapted from VCAA Psychology exam 1 2013 Q21

Question 12 (1 MARK)

Which of the following is not an example of an explicit memory?

- A. Knowing how to read the information on this page.
- B. A teacher learning the names of her new students.
- C. Learning a new bike route to take to work.
- D. Remembering the author of your favourite book.

Adapted from VCAA Psychology exam 1 2013 Q43

Question 13 (1 MARK)

The brain structure which encodes memories that are retrieved without conscious awareness is the

- A. neocortex.
- B. hippocampus.
- C. cerebellum.
- D. hypothalamus.

Adapted from VCAA Psychology exam 2018 Q11

Question 14 (2 MARKS)

Outline a difference between implicit and explicit memory.

Question 15 (2 MARKS)

Describe the role of the hippocampus and cerebellum in relation to memory.

Adapted from VCAA Psychology exam 2014 Q1

Apply and analyse

Question 16 (1 MARK)

Nancy learned how to ride a bike when she was a young child and used to ride to school every morning. As an adult, she believed she had forgotten how to ride a bike until she attempted the skill. She was surprised to find that she still knew how to ride a bike 30 years later.

This is due to her

- A. short-term memory.
- B. procedural memory.
- C. episodic memory.
- D. explicit memory.

Adapted from VCAA Psychology exam 1 2012 Q31

Use the following information to answer questions 17 and 18.

Viola is playing the viola at her school's talent show. Viola is about to go on stage and is reading over her sheet music for the final time. She is feeling nervous about the performance and is constantly fidgeting with her bracelet, which is an unconscious habit she does when she feels anxious and apprehensive.

Question 17 (1 MARK)

Viola's understanding of how to play the viola and her knowledge of the music notes are examples of

- A. explicit memory, implicit memory.
- B. implicit memory, episodic memory.
- C. procedural memory, non-declarative memory.
- D. procedural memory, semantic memory.

Question 18 (1 MARK)

Which part of the brain is involved in Viola's habit of fidgeting with her bracelet?

- A. Cerebrum.
- B. Basal ganglia.
- C. Neocortex.
- D. Hippocampus.

Question 19 (6 MARKS)

Dr Tsumi wants to investigate whether she can produce a classically conditioned memory of fear of clowns in young infants. Hiro is an infant who is staying at the hospital she works at. Without asking Hiro's mother for permission, Dr Tsumi decides to conduct her little experiment on Hiro. Dr Tsumi uses an old jack-in-the-box clown toy that makes a very loud screeching noise every time it opens and the clown pops up. When she presents the box to Hiro, he starts crying immediately when he hears the loud screeching noise after the clown pops up. Dr Tsumi continues presenting the jack-in-the-box to Hiro and he continues to be afraid of it. Later, when the hospital runs a charity day and Hiro is visited by a friendly clown entertainer, he immediately starts crying. When Hiro's mother finds out about the experiment, she is very upset. She tries to take Hiro away from the experiment, but Dr Tsumi insists that it is a standard procedure all infants go through before they are discharged from the hospital.

- a. Identify the type of memory that Hiro's emotional response to the clown represents. (1 MARK)
- b. Outline the role of the amygdala in the formation of Hiro's memory. (1 MARK)
- c. Were there any ethical considerations breached by Dr Tsumi? Justify your response. (4 MARKS)

Question 20 (4 MARKS)

Theodore, a history teacher, taught his class all about the Russian Revolution. He was able to remember all the key dates, figures, and facts without even looking at his notes.

- a. Identify the type of memory which allowed Theodore to remember facts about the Russian Revolution. (1 MARK)
- b. Explain which brain structure was involved when Theodore encoded this memory. Justify your response. (2 MARKS)
- c. Identify where this memory would have been stored in the brain. (1 MARK)

Questions from multiple lessons

Question 21 (1 MARK)

Emotionally arousing memories that involve fear can be created through the process of

- A. observational conditioning.
- B. classical conditioning.
- C. storage.
- D. the General Adaptation Syndrome.

Question 22 (7 MARKS)

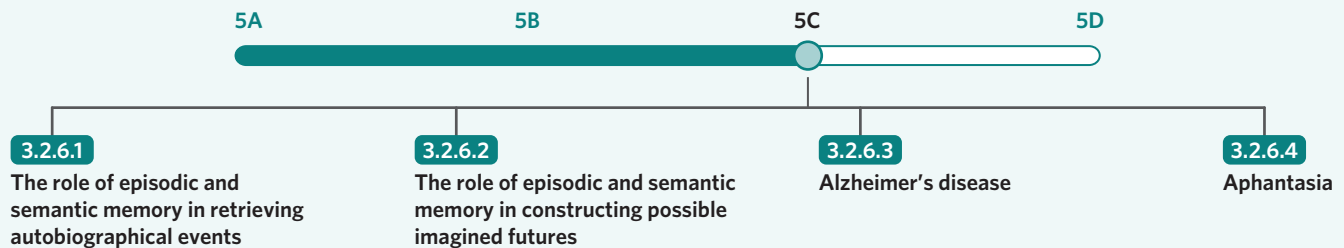
Millie's mum is a dance instructor who has been trying to help Millie increase her flexibility so she could move into the advanced dance class. After repeatedly watching her mum teach a routine to an advanced dance class, during which she successfully encoded the steps involved, she finds that she is still unable to perform the routine.

- a. Identify the type of long-term memory involved in the dancers learning how to perform the dance routine. (1 MARK)
- b. Using examples, outline the two stages of observational learning that Millie has achieved and a stage which she has not achieved. (6 MARKS)

5C The role of episodic and semantic memory in remembering and imagining

STUDY DESIGN DOT POINT

- the role of episodic and semantic memory in retrieving autobiographical events and in constructing possible imagined futures, including evidence from brain imaging and post-mortem studies of brain lesions in people with Alzheimer's disease and aphantasia as an example of individual differences in the experience of mental imagery



Time travel is a concept taken straight out of science fiction novels and films. However, our brains actually have the capacity to travel through time. Mental time travel can involve travelling to the past by remembering lived experiences, and can also involve stepping forward in time by imagining future events. The ability of the mind to travel through time relies heavily on our memory system, specifically our semantic and episodic memory.

In this lesson, you will learn about the role of episodic and semantic memory in retrieving autobiographical events and constructing possible imagined futures. You will also learn about Alzheimer's disease and aphantasia, and how these conditions can impact episodic and semantic memory.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Semantic memory

a type of explicit memory that consists of general knowledge or facts

Episodic memory

a type of explicit memory that consists of personal experiences or events

Autobiographical events

personally lived experiences

Retrieval the process of accessing information that has been stored in long-term memory and bringing it into our conscious awareness in short-term memory

The role of episodic and semantic memory in retrieving autobiographical events 3.2.6.1

Think back to your first day of high school. Do you remember what day it was? Do you remember which classmates you met that day? What were your first impressions of them? Did you feel nervous or excited about starting school? These questions relate to the different types of memory involved when we recall life events. In this section, we will outline these memory types and explain how they overlap when retrieving autobiographical memories.

Theory details

Semantic and episodic memories are both types of explicit memories. **Semantic memory** consists of general knowledge or facts whilst **episodic memory** consists of personal experiences or events. Episodic memory is often associated with **autobiographical events**, which refer to personally lived experiences. Examples of autobiographical events may include:

- your first day of school
- memories from a family vacation
- a birthday party.

These autobiographical events are stored in long-term memory and are retrieved every time you think or speak about them. **Retrieval** is the process of accessing information that has been stored in long-term memory and bringing it into our conscious awareness in short-term memory.

Research shows that the hippocampus is primarily involved in the retrieval of episodic memories and that the frontal and temporal lobes are involved in the retrieval of semantic memories (Tulving et al., 1991).

However, studies have found that the retrieval of autobiographical events involves the activation of both these brain areas, suggesting that autobiographical events involve an overlap of episodic and semantic memory (Burianova et al., 2010).

This may occur because autobiographical events contain information that is semantic, such as the date or location of the event. Additionally, autobiographical events also contain episodic components, which are more specifically related to the personal experience of the event, such as recalling the feeling of being nervous or happy during the event. The episodic component of autobiographical events allows for the event to be remembered in rich detail. An example of the overlap between episodic and semantic memory in the retrieval of autobiographical events can be seen in figure 1.



Figure 1 The retrieval of an autobiographical event, such as a birthday party, involves both semantic and episodic memory

PSYCHOLOGY EXPLORATION

When you retrieve autobiographical events from your long-term memory, you do not replay every single aspect of the event, but rather piece the memory together to create a mental representation of the event. This is known as reconstruction, which refers to the process of combining different pieces of information from memory in an attempt to create a comprehensive recollection of an event in its original order or form.

However, the process of reconstruction is not always accurate and reliable. Psychologist Elizabeth Loftus discovered that individuals may falsely reconstruct their memories of events if they receive misleading information about the event. This can lead to an individual producing memories of an event that differ from what actually happened or producing a memory that did not even occur!

For example, one study investigated if suggestive information could lead adults to report false autobiographical memories from their childhood. Participants were shown an altered image of themselves as a child on a hot air balloon ride. The experimenters questioned the participants about the event and encouraged them to provide any details they remembered. The results of the study showed that participants were able to construct their own narrative of this event and truly believed they had been on a hot air balloon, despite the fact that it never occurred (Wade et al., 2002).

The role of episodic and semantic memory in constructing possible imagined futures 3.2.6.2

Imagine you are preparing to present a speech at a school assembly. You see yourself standing at the podium in the familiar assembly room. You know where the microphone is and mentally practice how you are going to move around the room and interact with your audience. You are also considering whether you should include humour in your speech. You remember that last time you presented in front of the school, everyone laughed at your jokes and told you that your presentation was engaging. This fictional scenario highlights how you might draw on elements of episodic and semantic memory when constructing possible imagined futures.

LESSON LINK

In lesson **5A Atkinson-Shiffrin multi-store model of memory**, you learnt about the Atkinson-Shiffrin model of memory. In this model, memories are encoded from short-term memory and stored in the long-term memory system. Retrieval involves accessing and using these memories by bringing them into short-term memory. Therefore, when retrieving autobiographical events, you are accessing the information from long-term memory and bringing it into short-term memory.

Possible imagined futures hypothetical experiences and situations that an individual has the ability to create and conceptualise in their mind

Theory details

Episodic and semantic memory are also involved in constructing **possible imagined futures**, which refer to hypothetical experiences and situations that an individual has the ability to create and conceptualise in their mind.

Some examples of possible imagined futures may include

- imagining what you're going to do tomorrow
- imagining how you might present a speech
- imagining yourself in an argument with your parents and considering how it might go and what is best to say
- envisioning what you might wear to a party and imagining people complimenting your outfit.

The brain regions that are involved in the retrieval of autobiographical memories are also activated when people construct possible imagined futures. Schacter et al. (2008) found that patients who sustained damage to their hippocampus not only experienced difficulty remembering past events, but also struggled to imagine future scenarios. This is because when individuals attempt to mentally construct a possible imagined future, they draw on elements of past experiences from their semantic and episodic memory.

Semantic memory is involved in the construction of possible imagined futures as individuals must be able to envision possible scenarios that are consistent and fit in with what they already know about the world. Episodic memory is also involved by allowing individuals to construct a possible imagined future that is subjective and includes more richly detailed elements, such as the people involved or emotional reactions. An example of how episodic and semantic memory influence the construction of a possible imagined future is depicted in figure 2.

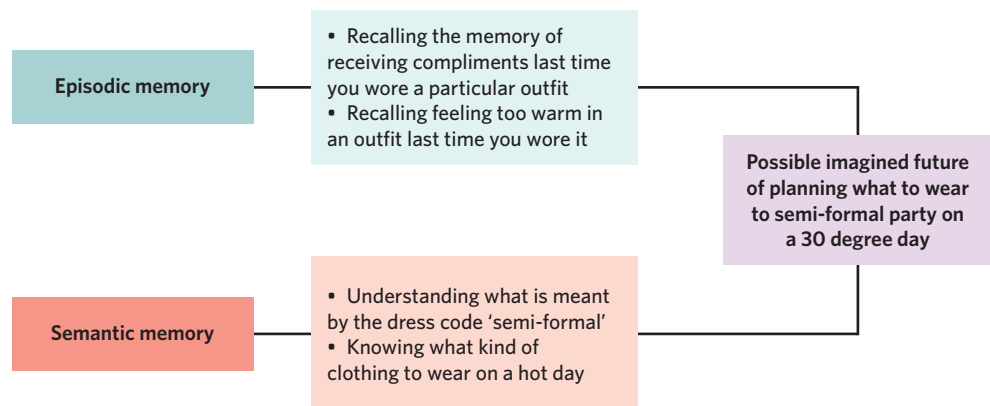


Figure 2 The construction of a possible imagined future involves both semantic and episodic memory

It's important to note that possible imagined futures do not always become a reality and are often a mental simulation of a hypothetical event. Despite this, the ability to imagine futures is very important as mentally 'trying out' different scenarios can guide our future behaviours. For example, being able to imagine future scenarios can help us anticipate potential consequences of our behaviour and decide whether or not we avoid or approach certain situations (Addis et al., 2007).

Alzheimer's disease 3.2.6.3

Do you know someone who has Alzheimer's disease? What do you notice about your interactions with them? You may have noticed that this individual tends to have trouble remembering details from the past. In this section, we will look at Alzheimer's disease and how it affects the brain. We will also look at how Alzheimer's disease disrupts memory and our ability to imagine possible futures.

Theory details

What is Alzheimer's disease?

Neurodegenerative diseases are diseases characterised by the progressive loss of neurons in the brain. **Alzheimer's disease** is an example of a neurodegenerative disease that is characterised by memory decline.

Neurodegenerative diseases diseases characterised by the progressive loss of neurons in the brain

Alzheimer's disease a neurodegenerative disease that involves the progressive loss of neurons in the brain and is characterised by memory decline

Some symptoms of Alzheimer's disease include:

- a decrease in cognitive functions, such as the ability to plan, problem-solve, and think logically.
- personality change.
- changes in mood and emotion.
- frequently becoming confused or disoriented.
- difficulty with language and communication.

How does Alzheimer's disease affect the brain?

Despite the presentation of these symptoms, a conclusive diagnosis of Alzheimer's disease can only be made through a post-mortem examination. A **post-mortem examination** is an assessment of a dead body that occurs to determine the cause of death. From a post-mortem examination, **lesions**, which refer to an area of tissue that has been damaged due to disease or injury, can be examined through neuroimaging. Therefore, what we know about the biological markers of Alzheimer's disease largely stems from brain imaging and post-mortem studies. In these studies, lesions are predominantly identified in the hippocampus. The two primary lesions associated with Alzheimer's disease are:

- **amyloid plaques**, which are fragments of the protein beta-amyloid that accumulate into insoluble plaques that inhibit communication between neurons.
- **neurofibrillary tangles**, which are an accumulation of the protein tau that forms insoluble tangles within neurons, which then inhibit the transportation of essential substances and eventually kill the neuron entirely.

These structures are depicted in figure 3.

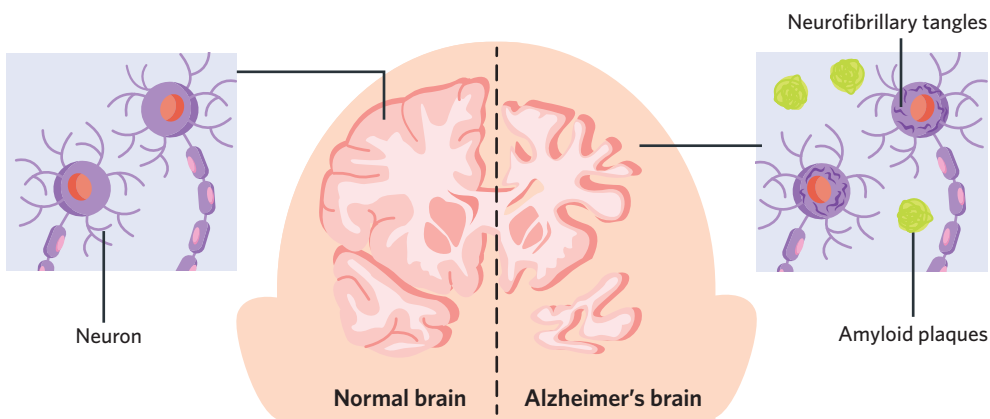


Figure 3 Lesions in a brain of someone with Alzheimer's disease in comparison to a healthy brain with no lesions

USEFUL TIP

Amyloid plaques block neural transmission between neurons. Imagine one person trying to communicate a message to another person. However, these people are separated by a brick wall. By contrast, neurofibrillary tangles are within neurons. Imagine this time that the two people are in the same room. However, the person who is trying to communicate the message is tongue-tied and cannot express the message that they want to communicate.

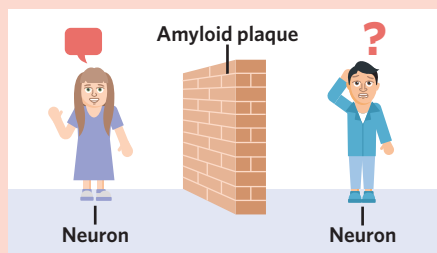


Figure 4 Amyloid plaques block neural transmission between neurons

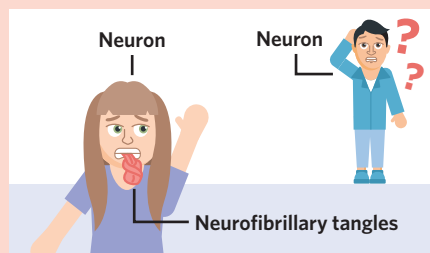


Figure 5 Neurofibrillary tangles inhibit neuronal function within a neuron

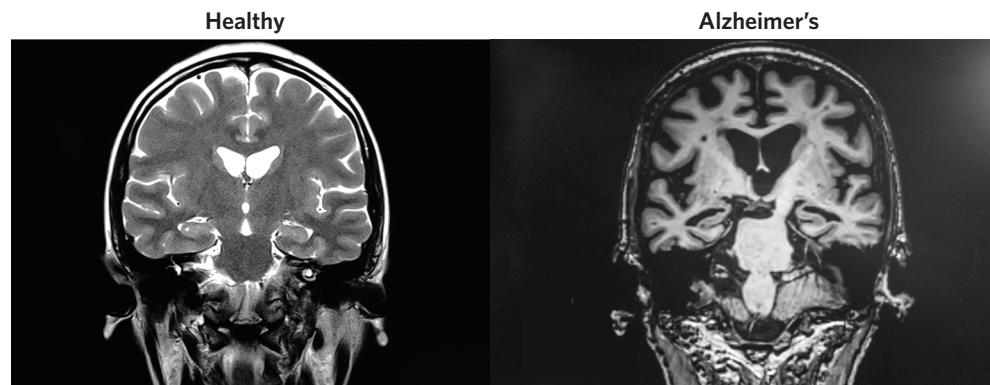
Post-mortem examination
an assessment of a dead body that occurs to determine the cause of death

Lesion an area of tissue that has been damaged due to disease or injury

Amyloid plaques
fragments of the protein beta-amyloid that accumulate into insoluble plaques that inhibit communication between neurons

Neurofibrillary tangles
an accumulation of the protein tau that forms insoluble tangles within neurons, which then inhibit the transportation of essential substances and eventually kill the neuron entirely

At the later stages of Alzheimer's disease, the brain can be observed as having significantly reduced in size due to a loss of brain matter which is attributed to the progressive loss of neurons. This is evident in figure 6, which compares an MRI of a normal brain to a brain with Alzheimer's disease.



Images (left to right): Flowersandtraveling, Atthapon Raksthapat/Shutterstock.com

Figure 6 Comparison of an MRI of a healthy brain and the brain of someone with Alzheimer's disease. The scan of the Alzheimer's brain shows more blank space, which indicates a loss of brain mass.

How does Alzheimer's disease affect episodic and semantic memory?

As damage can be associated with the hippocampus, patients with Alzheimer's disease may struggle to remember semantic and episodic components of personally experienced events. Additionally, a study found that individuals with Alzheimer's disease lacked the capacity to draw on episodic and semantic memories in order to plan and construct new future scenarios. In this study, they found that this inability to imagine futures compromised their social interactions, ability to plan and carry out these plans, as well as impairing their sense of identity (El Haj et al., 2015).

LESSON LINK

In lesson **5B Brain structures involved in memory**, you learnt about implicit and explicit memory and the brain regions involved in the storage and retrieval of these memories. Alzheimer's disease predominantly affects the hippocampus and therefore primarily disrupts the retrieval of episodic memories (explicit). However, depending on the severity and progression of Alzheimer's disease, implicit memories, which include procedural memory, may remain largely intact as these memories are associated with the cerebellum. Therefore, whilst an individual with Alzheimer's disease may forget semantic and episodic details of their life, such as where they live, they may still be able to carry out tasks that use procedural memory, such as playing the piano or reciting the steps to a familiar dance.

Aphantasia 3.2.6.4

When you read a novel, you likely create visual impressions of the characters and the scenes. For example, when you think of Harry Potter, you are likely to conjure up an image of a young boy with dark hair, round glasses, and a scar in the shape of a lightning bolt on his forehead. This is referred to as mental imagery. Although this may seem simple, some people lack the capacity to generate this type of imagery and this phenomenon is called aphantasia.

Theory details

Aphantasia is a phenomenon in which individuals lack the capacity to generate mental imagery. **Mental imagery** refers to the visual representations and experiences of sensory information without the presence of sensory stimuli. Mental imagery can vary in details and vividness, however, those with aphantasia describe themselves as not having the power to generate mental imagery altogether (Whiteley, 2020). Figure 7 shows how, when prompted to think about an apple, individuals can differ in their mental imagery. Some might see a green apple, while others might see a red apple. However, a person with aphantasia will be unable to produce a mental image of an apple and instead might think about it without actually seeing it. It is important to understand that there is no known cause for aphantasia; individuals can be born with it or suddenly acquire it during life.

Aphantasia

a phenomenon in which individuals lack the capacity to generate mental imagery

Mental imagery

the visual representations and experiences of sensory information without the presence of sensory stimuli

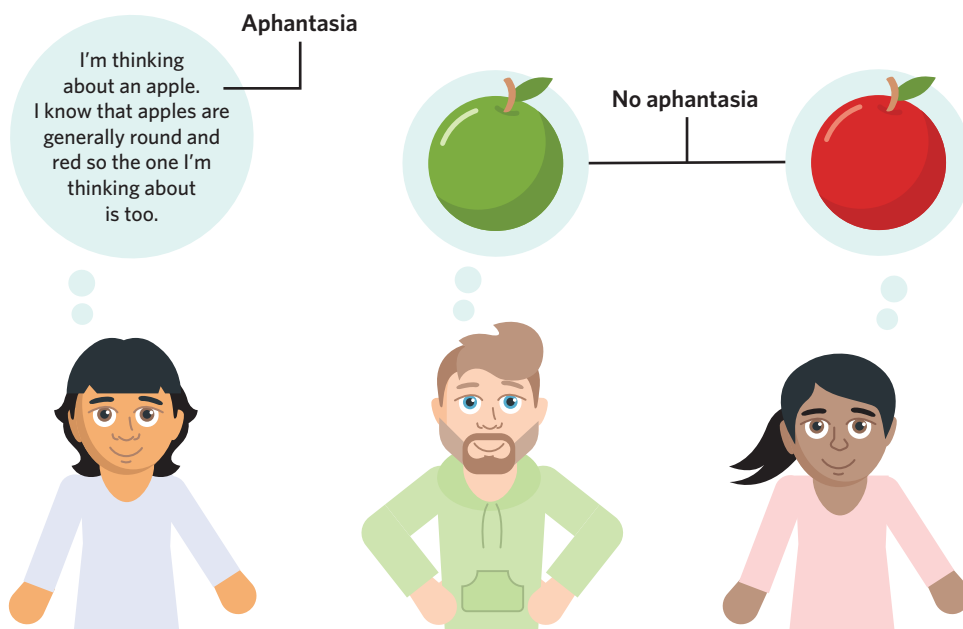


Figure 7 Comparison of individuals with aphantasia and individuals without aphantasia (The neurocritic, 2016)

USEFUL TIP

To help understand what aphantasia is, it is helpful to break down the word into 'a' and 'phantasia'. The word **phantasia** relates to fantasy and imagination, which both rely on the use of visual mental imagery. The prefix 'a' means 'without,' or 'the absence of'. Therefore, **aphantasia** can be considered as the absence of fantasy and imagination (mental imagery).

When creating mental imagery, individuals use sensory information that has been organised in short-term memory and then transferred to long-term memory to recreate perceptual experiences. This sensory information can be stored in both our semantic and episodic memories.

People without aphantasia are likely to draw on both episodic and semantic memory when creating mental imagery. For example, if an individual imagines themselves on a beach, they might picture themselves sitting on the grainy sand, looking out onto the blue water, and feeling the warmth of the sun on their skin. For these individuals, these mental representations are in the form of images, which rely heavily on episodic memory of past experiences at the beach, as well as semantic memory of what a beach is.

By contrast, people with aphantasia may not be able to visualise richly detailed and vivid episodic memories due to their inability to generate mental imagery. Additionally, while semantic memories may remain intact, the visual component of these memories may also be lacking. Returning to the beach example, an individual with aphantasia would still be able to anticipate what going to a beach involves, without forming a mental image, by drawing on other (non-visual) information from their episodic and semantic memory, such as the knowledge that beaches generally consist of sand and large bodies of water.

Research shows that people with aphantasia struggle to retrieve autobiographical events and construct possible imagined futures (Dawes et al., 2020). Firstly, it is difficult for people with aphantasia to retrieve personally lived experiences as they cannot generate vivid, detailed mental imagery of past autobiographical events from their long-term memory. Secondly, this makes it difficult for people with aphantasia to construct possible imagined futures. For example, people with aphantasia may struggle to generate mental imagery of a past holiday at the beach (retrieving autobiographical events), which may prevent them from generating mental imagery of a future holiday at a similar location (constructing possible imagined futures). Although people with aphantasia are still able to apply non-visual components of autobiographical memories to future events, their lack of mental imagery makes this process more difficult and less vivid than those without the condition.

Theory summary

In this lesson, you learnt about the role of episodic and semantic memory in retrieving autobiographical events and constructing possible imagined futures. You also learnt about how Alzheimer’s disease and aphantasia can impact this ability. Figure 8 presents a summary of the lesson.

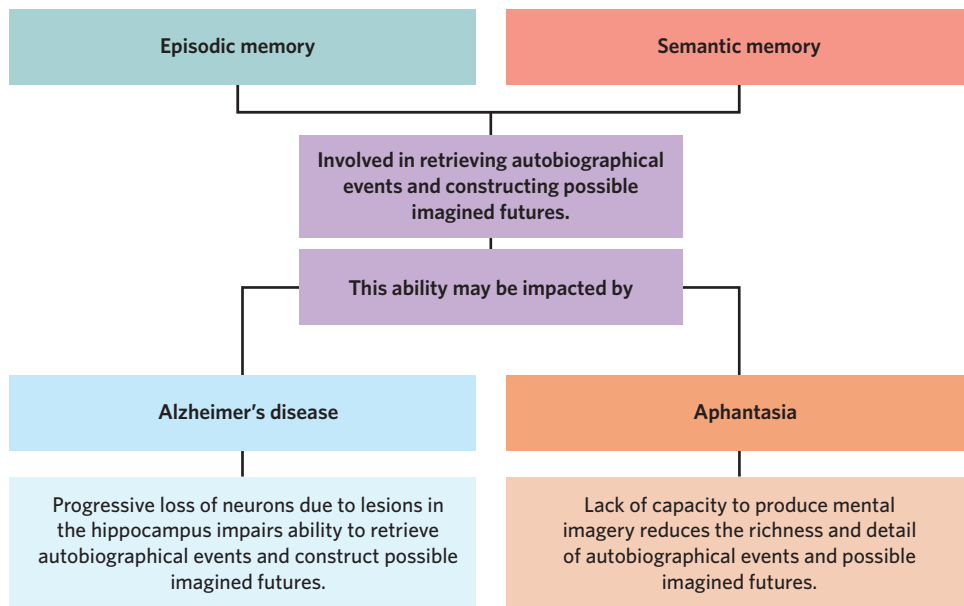


Figure 8 Summary of lesson 5C

5C Questions

Theory review

Question 1

Retrieving autobiographical events involves both episodic and semantic memory.

- A. True.
- B. False.

Question 2

Possible imagined futures always become a reality.

- A. True.
- B. False.

Question 3

Which of the following is an example of a neurodegenerative disease?

- A. Episodic memory.
- B. Alzheimer’s disease.
- C. Aphantasia.

Question 4

Aphantasia is characterised by an inability to generate _____.

Which of the following best fills in the blanks?

- A. mental imagery
- B. autobiographical events

Assessment skills

Text analysis

The following assessment skills type reflects the study design assessment dot point:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 5-7.

An amnesiac patient, K.C., suffered head trauma following a motorcycle accident. K.C. still demonstrated cognitive abilities such as attention, intelligence, and language function. He could also recall facts from the past, such as general knowledge about the world and who his family members were. However, K.C. was unable to answer any questions related to episodes from his personal past. K.C.'s ability to think about his future was also examined. When K.C. was asked what his plans were for tomorrow, K.C. was unable to answer the question. He indicated that he experienced that same kind of mental blankness when he tried to remember episodes from his past and when he tried to imagine possible futures.

(Tulving & Annis, 1985)

Question 5

Which of the following statements best reflects K.C.'s impaired ability to retrieve autobiographical events from his memory?

- A. 'K.C. was unable to answer any questions related to episodes from his personal past.'
- B. 'When K.C. was asked what his plans were for tomorrow, K.C. was unable to answer the question.'

Question 6

Which region of the brain was most likely affected following the motorcycle accident?

- A. Cerebellum.
- B. Hippocampus.
- C. Frontal lobe.

Question 7

Which of the following most accurately suggests why K.C. experienced difficulty constructing possible imagined futures?

- A. K.C. was unable to answer the question regarding his plans for tomorrow because he didn't know what he was doing.
- B. K.C. was unable to remember episodes of his past and draw on these experiences to construct possible imagined futures.
- C. K.C. couldn't imagine possible futures because he didn't remember facts from his past, such as general knowledge of the world

Perfect your phrasing

Question 8

Which of the following sentences is most correct?

- A. Alzheimer's disease is a neurodegenerative disease that involves the progressive loss of neurons in the brain, which **makes people forget things**.
- B. Alzheimer's disease is a neurodegenerative disease that involves the progressive loss of neurons in the brain, which **contributes to memory decline**.

Question 9

Which of the following sentences is most correct?

- A. Aphantasia is a phenomenon in which individuals **do not have** visual forms of mental imagery.
- B. Aphantasia is a phenomenon in which individuals **lack the capacity to generate** visual forms of mental imagery.

Exam-style

Remember and understand

Question 10 (1 MARK)

Retrieval of autobiographical events involves

- A. procedural and episodic memory.
- B. episodic and factual memory.
- C. episodic and semantic memory.
- D. semantic and prospective memory.

Question 11 (1 MARK)

The area of the brain that is associated with memory that is most likely to be affected by Alzheimer's disease is the

- A. substantia nigra.
- B. hippocampus.
- C. cerebellum.
- D. amygdala.

Adapted from VCAA Psychology exam 2017 MCQ5

Question 12 (2 MARKS)

Describe two neurological lesions that characterise Alzheimer's disease.

Apply and analyse

Use the following information to answer questions 13–15.

Belle and Beatrix attend a book club together. They just finished reading a novel and planned to see the film adaptation together. When they were watching the film, Beatrix told Belle that the main character wasn't how she imagined he'd look. In the book, the character was described as a mischievous boy with red hair and blue eyes. Beatrix explained how she thought the main character would look like her younger brother who also has light red hair and loved to play pranks on her. Belle was confused by this statement as she was unable to visualise the main character in her mind, but thought that the main character in the film did match the description in the book as he did have red hair and blue eyes.

Question 13 (1 MARK)

Belle may have

- A. Alzheimer's disease.
- B. aphantasia.
- C. a lack of fantasy.
- D. difficulty imagining characters.

Question 14 (1 MARK)

When imagining what the main character looked like, Beatrix relied on her

- A. semantic memory, which involved recalling how her brother acts and what he looks like.
- B. episodic memory and semantic memory, which respectively involved remembering that her brother is a boy and has red hair.
- C. procedural memory, which involved knowing what the colour blue and red look like.
- D. semantic and episodic memory, which respectively involved remembering what a boy with red hair looks like and remembering that her brother was mischievous when he played pranks on her.

Question 15 (1 MARK)

Belle was able to recognise that the main character in the film matched the book's description. This is because

- A. Belle drew on information from her episodic memory, such as the knowledge of what red hair and blue eyes look like.
- B. Belle drew on her ability to create mental imagery to imagine what the main character looked like.
- C. Belle drew on non-visual information from her memory, such as how the character was described.
- D. Belle drew on her knowledge of what Beatrix's brother looked like.

Question 16 (3 MARKS)

Daphne has plans to fly to Queensland in the morning. Last time Daphne was on an aeroplane, she remembers that she vomited and felt extremely nauseous due to motion sickness. She also recalls that listening to music helped calm her down. Daphne also recalls that there is medication that helps treat motion sickness that she can buy from her local chemist. Therefore, in preparation for the flight, Daphne imagines taking the motion sickness tablets in the morning and imagines herself sitting on the plane and listening to music.

With reference to episodic and semantic memory, explain how Daphne is constructing a possible imagined future.

Question 17 (6 MARKS)

Yusuf is an 80-year-old man who has been diagnosed with Alzheimer's disease. His granddaughter, Zoya, has aphantasia. Zoya is telling her grandfather how they went to her school together last week for a Grandparent's day celebration. Yusuf is struggling to remember the event.

- a. With reference to the hippocampus, explain how Alzheimer's disease may impact Yusuf's ability to remember autobiographical events. (3 MARKS)
- b. Using an example, discuss how Zoya's retrieval of the event may be impacted by her aphantasia. (3 MARKS)

Questions from multiple lessons

Question 18 (8 MARKS)

Dr Pierre is interested in studying the effectiveness of a particular medicine in increasing the volume of the hippocampus. In order to test this, Dr Pierre recruited elderly patients at the hospital where he worked and allocated them into one of two groups. One group was asked to take the medication while the other group took no medication. An MRI was conducted before and after the experiment to determine the level of growth in participants' hippocampal volume. It was found that after six weeks the group taking the medication experienced a small increase in volume, while the other group experienced a significant decrease during this period.

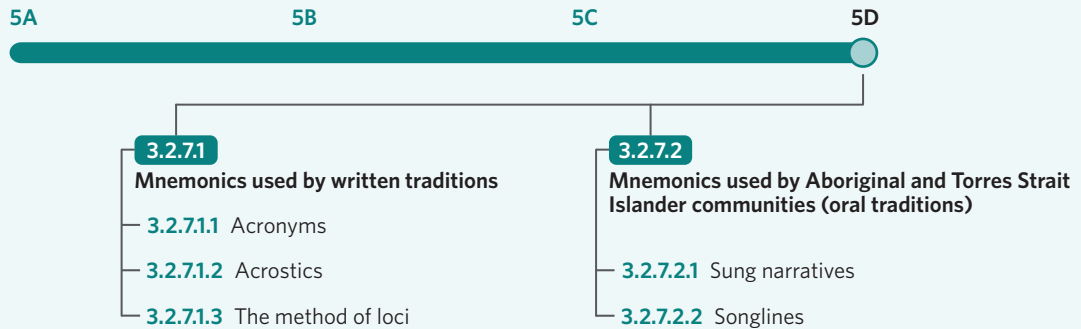
- a. Identify the sampling technique used by Dr Pierre. (1 MARK)
- b. Dr Pierre was unable to generalise the results from this investigation to people with Alzheimer's disease. Why? (1 MARK)
Adapted from VCAA Psychology exam 2018 Q4b
- c. Explain why the results of Dr Pierre's experiment may be of interest to researchers investigating Alzheimer's disease. (3 MARKS)
Adapted from VCAA Psychology exam 2018 Q4c
- d. Dr Pierre is also interested in studying the effectiveness of a particular medicine in increasing the volume of the cerebellum.

Will this drug impact semantic and episodic memory? Justify your answer. (3 MARKS)

5D Mnemonics

STUDY DESIGN DOT POINT

- the use of mnemonics (acronyms, acrostics and the method of loci) by written cultures to increase the encoding, storage and retrieval of information as compared with the use of mnemonics such as sung narrative used by oral cultures, including Aboriginal peoples' use of songlines



'Memory Needs Every Method Of Nurturing Its Capacity.' If you take the first letter of each word in this phrase, you'll see that it spells mnemonic. This phrase is an example of an acrostic to help you remember the spelling and function of mnemonics, which is to aid in the encoding, storage, and retrieval of information. In this lesson, you will learn about acronyms, acrostics, and the method of loci as examples of written mnemonics used by various cultures. You will also learn about Aboriginal and Torres Strait Islander peoples' oral tradition of sung narratives and Songlines as examples of mnemonics.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Written traditions practices in which knowledge, stories, and customs are preserved and shared through writing and reading

Mnemonics used by written traditions 3.2.7.1

How do you remember information for a test? Do you simply repeat the information over and over again in your head? Or do you use different strategies and techniques, such as creating rhyming poems, to help you remember information? In this section of the lesson, you will learn about the different strategies and mnemonics that can be used to improve memory and are associated with written traditions.

Theory details

What are written traditions?

Written traditions are practices in which knowledge, stories, and customs are preserved and shared primarily through writing and reading. Many cultures have written traditions, whereby knowledge and stories have been transcribed and documented in written form.

Historically, 'written cultures' have been viewed as communicating in a vastly different way from 'oral cultures', but in reality these differences are not as distinct as they appear. Every culture, from every part of the world, has both written and oral components. Written components can include anything from books and articles to different forms of visual arts, while oral components can include songs, dances and storytelling.

In this lesson, acronyms, acrostics and the method of loci are grouped as coming from written cultures, while sung narratives, including Aboriginal peoples' use of songlines, are explored as being a part of oral cultures. However, while reading about these different mnemonics, you will see lots of similarities between these two categories, and you should consider the universality of these techniques in improving memory for everyone.

What mnemonics are associated with written cultures?

Mnemonics are devices or techniques used to aid the encoding, storage, and retrieval of information. Mnemonics have been used by different cultures and communities for centuries to help retain information and preserve knowledge. The types of mnemonic devices used differ between written cultures and oral cultures.

Although there are a variety of mnemonics, they all share a similar purpose: aiding the encoding, storage, and retrieval of memory. Mnemonics are strategies or tricks that can help convert difficult-to-remember information into something more meaningful. Mnemonics do this by organising and linking new information to fit in with existing information in long-term memory, improving initial encoding of information. They also help to organise different pieces of information, such as unrelated items in a shopping list, into a more meaningful and cohesive whole. This can help ensure that the new information is stored in long-term memory. Additionally, these elaborate connections can create strong retrieval pathways to target information that improves the likelihood that information will be retrieved (Tullis & Qui, 2022).

While mnemonics can assist in helping to learn and store information, they do not actually decrease the amount of information that has to be stored. Instead, mnemonics create meaningful links to strengthen the storage of information. However, individuals need to spend time learning and rehearsing the mnemonic in order for it to work efficiently. Mnemonics can fail if an individual is unable to retrieve the mnemonic or if they fail to accurately interpret the mnemonic (Tullis & Qui, 2022).

There are many different types of mnemonic devices. Some involve verbalisation through rhythm or rhyme while others involve visual imagery. Acronyms, acrostics, and the method of loci are three examples of mnemonic devices associated with written traditions that will be explored in this lesson.

Acronyms 3.2.7.1.1

An **acronym** is a mnemonic device in which the first letters of items form a pronounceable word to aid memory. The word doesn't have to be a proper word and can be created by individuals. Examples of acronyms include:

- 'BODMAS', which is an acronym to remember the order of mathematical operations (Brackets, Order, Division, Multiplication, Addition, and Subtraction).
- 'FAST', which is an acronym to help remember and detect symptoms of a stroke (Facial drooping, Arm weakness, Speech difficulties, and Time).

Acronyms are commonly confused with abbreviations, however they differ in the sense that acronyms are pronounceable words. For example, the abbreviation AFL (Australian Football League) is not pronounced as one word but rather as individual letters.

Acronyms aid the encoding and storing of memory as they link information to words or sounds we already know. Additionally, the first letter of the word acts as a retrieval cue to help bring the targeted information into short-term memory for use.

Mnemonics devices or techniques used to aid the encoding, storage, and retrieval of information

Acronym a mnemonic device in which the first letters of items form a pronounceable word to aid memory

PSYCHOLOGY EXPLORATION

There has been a wide range of research exploring the effectiveness of mnemonics. Research suggests that the use of mnemonics improves learning of content and enhances retrieval of information. For example, a study conducted by Stalder (2005), found that students who used an acronym to help remember exam content achieved an average score of 70% on the exam, whereas students who did not use acronyms achieved an average score of 56%. This suggests that the use of the mnemonics improved student's exam performance and can therefore enhance memory.

Acrostic a mnemonic device in which the first letters of items create a phrase, rhyme, or poem to aid memory

Method of loci (also known as memory palace) a mnemonic device that converts items into mental images and associates them with specific locations to aid memory

USEFUL TIP

To help understand what the method of loci is, it is useful to know what *loci* means. The word *loci* is used to describe a position or place where something is situated. It is useful to remember that loci is linked to the location of something. Therefore, the method of loci involves visualising information in and placing them in familiar locations to help encode, store, and retrieve this information.

Acrostics 3.2.7.1.2

An **acrostic** is a mnemonic device in which the first letters of items create a phrase, rhyme, or poem to aid memory. Acrostics may be particularly helpful when you have to remember things in a certain order. Examples of acrostics include:

- ‘Never Eat Soggy Weet-bix’, which is an acrostic to help remember the compass directions (North, East, South, and West).
- ‘Every Good Boy Deserves Fruit’, which is an acrostic to help remember the music notes on the line of the treble clef (E, G, B, D, and F).

Acrostics link new information to familiar phrases or sentences we already know, which helps encode and store information. Like acronyms, the first letter of each word acts as a retrieval cue to help bring the targeted information into short-term memory for use.

The method of loci 3.2.7.1.3

The **method of loci** is a mnemonic device that converts items into mental images and associates them with specific locations to aid memory. Unlike acronyms and acrostics, the method of loci involves visualising items in specific, well-known locations.

There are five steps involved in the method of loci (Twomey & Kroneisen, 2021). Individuals need to:

1. visualise and imagine a familiar route or place (e.g. their house or walk to school).
2. select several memorable places (landmarks) on the route or in their chosen place (e.g. their bedroom or a bus stop).
3. create visual imagery for each item that needs to be remembered (e.g. a milk carton).
Creating bizarre or funny mental imagery can help strengthen the likelihood of the item being remembered (Varilias, 2019).
4. link each item to one of the identified memorable landmarks.
5. imagine they are walking through the house or along the familiar route and retrieve each item by observing the items at each landmark.

For example, an individual may try to remember ingredients for a cake. An individual may choose to visualise their bedroom. They may then select particular landmarks, such as their bed, desk, or lamp. Then they need to create visual imagery for each ingredient and link it to the landmarks. For example, they may visualise a bag of flour that has broken and spilt all over the bed or a chocolate bar hidden underneath a pillow. When they go to the supermarket to buy the ingredients, they may retrieve their list by mentally walking in their bedroom and retrieving the ingredients by observing them at the different landmarks.

The method of loci assists in the encoding and storage of memories by visually linking new information to familiar places or routes. Like acrostics, the method of loci is particularly useful in remembering information in a certain order. During retrieval, mentally walking through the familiar location acts as a retrieval cue and individuals are able to retrieve the items they mentally placed there.

The method of loci works particularly well when the listed items are embedded into a story that includes vivid and memorable characters. For instance, in remembering the cake ingredients, you may imagine yourself carrying a bag of flour into your bedroom when a detective with a crazy hat grabs it because they need something to use for fingerprint powder.

PSYCHOLOGY EXPLORATION

The method of loci was first proposed by Simonides of Ceos, an Ancient Greek polymath, musician, poet, and writer. Simonides attended a banquet dinner and was asked to briefly step outside of a meeting to meet two men. While he was outside, the entire stone building collapsed, killing everyone inside and leaving them unrecognisable. Although they were unrecognisable, Simonides discovered that he was able to identify who the remains belonged to as he recalled the position of where they sat around the table. From this experience, Simonides proposed that by mentally remembering a location and retracing one's steps through that location, individuals can remember items that were placed there. This became the basis of the method of loci and Simonides' theory was then preserved and documented by Cicero in his exposition, 'De Oratore'.

As you can see, acronyms, acrostics, and the method of loci use different methods which serve the same purpose of aiding encoding, storage, and retrieval of information. Figure 1 provides an example of how the different mnemonic devices can be used to remember the same concept.

Different mnemonics used to assist in remembering the order of the colours of the rainbow.

Acronym
ROY G. BIV

Acrostic
Richard Of York Gave Battle In Vain.

Method of loci

- As you walk into your house, you place your glittery **RED** jacket on the coat hanger.
- An excited **ORANGE** cat greets you in the hallway.
- You then walk into the kitchen and turn on the bright **YELLOW** light.
- In your kitchen bin there is a giant **GREEN** monster sifting through your rubbish.
- You turn to open the fridge and find a giant **BLUE** carton of milk.
- You go to sit with your glass of milk on the **INDIGO** wooden chair.
- On the table is a massive, overflowing vase of **VIOLET** flowers.

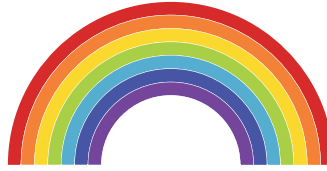


Figure 1 The use of an acronym, acrostic, and the method of loci to remember the colours of the rainbow

LESSON LINK

In lesson **5B Brain structures involved in memory**, you learnt about the different types of long-term memory, including explicit and implicit memories. Mnemonics are typically used to assist in the encoding, storage, and retrieval of explicit memories, as opposed to implicit memories. This is because using mnemonics is an intentional process in which individuals have to consciously organise new information and retrieve this information. In particular, mnemonics are typically used to remember semantic information. For example, to remember the order of the planets (which is semantic memory) you can use the acrostic 'My Very Eager Mother Just Served Us Nachos' (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune).

Mnemonics used by Aboriginal and Torres Strait Islander communities (oral traditions) 3.2.7.2

As stated earlier in this lesson, Australian Aboriginal and Torres Strait Islander communities are not purely 'oral cultures,' however they have sometimes been categorised in this way because they do have strong and continuing oral traditions. These oral traditions have and continue to be highly effective in their ability to transfer and preserve the knowledge of a community's collective memory. In this section of the lesson, you will learn about some oral traditions used by Aboriginal and Torres Strait Islander communities to aid memory.

Theory details

Oral traditions are practices in which knowledge, stories, and customs are preserved and shared through spoken word and movement. Oral traditions are a great part of Aboriginal and Torres Strait Islander cultures and are an effective way to preserve and celebrate any community's knowledge systems, stories, and customs. Although every unique community and language group has its own traditions and mnemonic devices, this section of the lesson will explore two common approaches: Sung narratives and Songlines.

Before learning about these two mnemonic devices, it is important to note that Songlines and Sung Narratives cannot be viewed in isolation as purely 'oral traditions' because they are always interconnected with, and cannot exist without, non-oral forms of cultural knowledge and practices. Nevertheless, Aboriginal and Torres Strait Islander's oral traditions have ensured that important cultural and survival knowledge has been created, transferred, and remembered for thousands of years.

WANT TO KNOW MORE?

Aboriginal and Torres Strait Islander oral traditions of storytelling are diverse and differ from one community to the next. They also take many forms, including dance, performance, learning through observation, practice, and repetition (as you learnt in **4D Aboriginal and Torres Strait Islander approaches to learning**) and Yarning (conversation). Each of these traditions plays an important role in reflecting and sustaining rich Aboriginal and Torres Strait Islander cultures.

Oral traditions practices in which knowledge, stories, and customs are preserved and shared through spoken word and movement

USEFUL TIP

The terms 'Sung narratives' and 'Songlines' are both English-derived words used to describe Aboriginal and Torres Strait Islander cultural traditions. Aboriginal and Torres Strait Islander communities nationwide have a diverse range of words in their own languages to describe these two phenomena.

Sung narratives stories that share important cultural, ecological, and survival information through the use of singing, harmony, and rhythm

Songlines multimodal performances conducted as a family or community travels through Country and spaces in the landscape that record journeys, link important sites, and describe ways to live, care for, and nurture Country

Sung narratives 3.2.7.2.1

Sung narratives are stories that share important cultural, ecological, and survival information through the use of singing, harmony, and rhythm. Traditionally, Sung narratives are used in a variety of cultures and are performed to pass on information. The receivers of these tales learn them through the use of vocal song and rhythm.

Narration and rhythm in Sung narratives can enhance the encoding, transferring and retrieval of vital cultural and survival information. Performing and receiving the Sung narratives can bring enjoyment, and pride of culture and place, to those who are singing and to those who are listening.

Aboriginal and Torres Strait Islander communities have known the benefits of singing and its ability to reinforce message transfer and memory for thousands of years. Songs sung daily, weekly, or at special times in ceremony, are learnt by children and repeated as they grow older to become part of their embodied memory.

Importantly, traditional law continues to describe how Sung narratives are communicated, including:

- what is sung
- who sings and to whom
- where and when a Sung narrative is communicated.

A person's position in the community, their gender, and their age determine if they can sing or hear certain songs. Some Sung narratives are for all to hear, are pure expressions of culture and joy, and are often celebrated at community events. Sung narratives continue to play a vital role in the preservation and celebration of Aboriginal and Torres Strait Islander cultures and knowledges.

Songlines 3.2.7.2.2

Songlines are multimodal performances conducted as a family or community travels through Country and spaces in the landscape that record journeys, link important sites, and describe ways to live, care for, and nurture Country. Importantly, songlines are not just songs; they are the connection between songs and performances conducted by the group and the physical paths travelled. Songlines carry laws and stories that Aboriginal and Torres Strait Islander people live by. They celebrate Aboriginal and Torres Strait Islander people's interconnectedness with Country (Land, Water, and Sky) and Culture (Ways of knowing and being) through song and stories. First Nations people's identity is deeply interconnected with their relationships with Country and their family's ancestral links to Country.

Prior to Colonisation, First Nations communities moved freely through and in harmony with the Country. Songlines are sung as a family or community travels through Country and spaces in the landscapes. They are expressions of ecological and spiritual knowledge that provide information for survival. For example, Songlines can tell of safe pathways for travel through areas, safe camping and meeting places, sacred sites to find or avoid, waterholes, and locations for sources of food and materials needed for survival.

Songlines use rhythm and narrative to communicate information linked to the landscape, which can enhance the encoding of this information (Kelly, 2016). Singing a Songline is a show of deep respect for Country, and for the ancestors and the spiritual beings that once walked the earth. When Songlines are sung, and individuals walk through the landscape (in reality or in their minds, similarly to how the method of loci may be used), individuals are able to retrieve the information that is linked to the different stories and places along the route (Kelly, 2016).

Songlines have been guarded and taught by Elders for thousands of years. They are interconnected with other oral and non-oral traditions, and collectively all these traditions hold memories of maps of the land and ecological systems. Clan groups and Indigenous communities nationwide continue to learn and sing their own established Songlines that contain and communicate necessary cultural information, such as land use and astronomical and navigation information (Reser et al., 2021). These stories and memories sustain Country, protect communities and are expressions of resilient, resourceful, and creative cultures.

USEFUL TIP

Songlines use similar processes as the method of loci, in that they both associate particular information with physical space. However, Songlines are sophisticated mnemonic devices that enable the storage of immense amounts of information and utilise multimodal forms, such as song, dance, and performance, to aid memory. In this way, the method of loci can be seen as a more basic version of Songlines.

WANT TO KNOW MORE?

You may see Aboriginal groups and communities referred to by different terms, such as 'mob', 'clan' or 'language group'. To learn more about what each of these terms mean and how they are used, type the URL deadlystory.com into your browser, and search for 'clan' on the website.

WANT TO KNOW MORE?

Songlines are also known as 'Dreaming tracks' as they have particular ancestral stories connected to them that are informed by the Creation Spirits during the Dreaming (creation of the world). Songlines trace the astronomical and geographical elements from these ancestral stories and describe how these stories have shaped the landscape. In this way, Songlines create a map of Country that is intricately linked to Dreaming stories.

Songlines have been used by Aboriginal and Torres Strait Islanders peoples for thousands of years. As mentioned previously, each clan has its own traditional Songlines that communicate necessary information about the land for their clan. To learn more about Songlines:

1. Search for 'The Wirangu Seven Sisters creation story' (ABC Australia, 2020) on YouTube and watch the 8-minute and 32-second video. In this video, Susie Betts guides you through the Wirangu Seven Sisters Songline. This video can help further your understanding of Songlines by providing a specific example relevant to a clan.
2. Additionally, you can expand on your understanding of Songlines by typing the URL commonground.org.au/learn/songlines into your browser.

Theory summary

In this lesson, you learnt about how mnemonics assist in the encoding, storage, and retrieval of information. In particular, you learnt about mnemonics associated with written traditions, including acronyms, acrostics, and the method of loci. You also learnt about mnemonics associated with oral traditions, including Aboriginal and Torres Strait Islander people's use of Sung narratives and Songlines. Figure 2 presents a summary of the lesson, demonstrating how all the mnemonics used are associated with oral and written traditions.

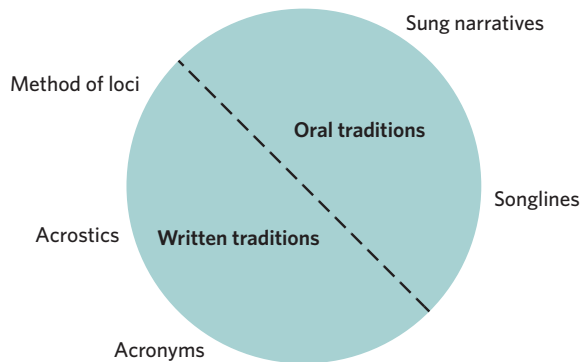


Figure 2 Summary of lesson 5D

5D Questions

Theory review

Question 1

Mnemonics are techniques that help encode, store, and retrieve information.

- A. True.
- B. False.

Question 2

Which of the following are mnemonics used by written traditions? **(Select all that apply)**

- I. Method of loci.
- II. Sung narratives.
- III. Acrostics.
- IV. Acronyms.
- V. Songlines.

Question 3

Which of the following mnemonics involve the use of the first letter of items? **(Select all that apply)**

- I. Method of loci.
- II. Sung narratives.
- III. Acrostics.
- IV. Acronyms.
- V. Songlines.

Question 4

Visualisation is necessary when using _____.

Which of the following best fills in the blank?

- A. acrostics and acronyms
- B. the method of loci and Songlines

Question 5

Sung narratives and songlines

- A. use written words and images to transmit information.
- B. use narrative and song to transmit information.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies, and methods, and findings from three student practical activities

Question 6

Acronyms and acrostics are the same as they both use the first letter of items.

- A. True.
- B. False.

Question 7

Which of the following best describes the difference between written and oral traditions?

- A. Oral traditions are from ancient civilisations whilst written traditions are from modern civilisations.
- B. Though all cultures use written and oral traditions, oral traditions preserve and share knowledge primarily through spoken word while written traditions preserve and share knowledge primarily through reading and writing.
- C. Oral traditions and written traditions both use mnemonics.
- D. There is no difference between written and oral traditions as knowledge is preserved regardless.

Question 8

Acronyms, acrostics, and the method of loci are similar because they **(Select all that apply)**

- I. require no effort to be learnt.
- II. involve linking new information to familiar words, phrases, or locations in long-term memory.
- III. involve visual imagery.
- IV. are examples of mnemonics that use written traditions.

Question 9

Narrative, rhythm, and song are shared characteristics of

- A. the method of loci and Sung narratives.
- B. Sung narratives and Songlines.
- C. acrostics and Songlines.
- D. songs and written stories.

Question 10

Which of the following is a similarity between Songlines and the method of loci?

- A. Both use words to aid the encoding, storage, and retrieval of information.
- B. Both are used by written traditions.
- C. Both use place to aid the encoding, storage, and retrieval of information.
- D. Both are used by oral traditions.

Exam-style**Remember and understand****Question 11** (1 MARK)

A mnemonic helps to encode and store memories by

- A. decreasing the amount of information that needs to be remembered.
- B. repeating important information.
- C. linking new information to familiar information in long-term memory.
- D. converting new information into a useable form.

Question 12 (1 MARK)

'Fat Chefs Burn Lamb Loins' is a phrase to help remember the order of the streets in Melbourne (Flinders, Collins, Bourke, Lonsdale, and La Trobe street). This is an example of a/an

- A. Songline.
- B. Sung narrative.
- C. acronym.
- D. acrostic.

Question 13 (2 MARKS)

Using an example, describe what is meant by an acronym.

Question 14 (2 MARKS)

What is one similarity and one difference between acronyms and acrostics?

Question 15 (3 MARKS)

Suggest how Songlines can help encode and retrieve information.

Apply and analyse

Use the following information to answer questions 16–19.

Jo is going to a shop called 'Little Burgers' for lunch. At 'Little Burgers', customers can build their own burgers. Amy, Jo's little sister, tells her to order her a burger with the ingredients placed in specific order: a slice of cheese, a spread of avocado, a slice of tomato, some fried chicken, and then finally a slice of ham.

Question 16 (1 MARK)

Jo decided to use an acrostic to help her remember the order of Amy's burger.

A possible example of her acrostic is

- A. CATCH.
- B. Clowns Annoy Terrified Children Hourly.
- C. The cheese said to the avocado and tomato, 'Why is the chicken kissing the ham?'
- D. Cheesy, avocado burgers taste better with tomato, chicken, and ham.

Adapted from VCAA Psychology exam 2015 Q49

Question 17 (1 MARK)

Amy suggested that Jo would find an acronym more effective to remember the order of her burger.

A possible acronym for her burger would be

- A. CATCH.
- B. Clowns Annoy Terrified Children Hourly.
- C. The cheese said to the avocado and tomato, 'Why is the chicken kissing the ham?'
- D. Cheesy, avocado burgers taste better with tomato, chicken, and ham.

Adapted from VCAA Psychology exam 2015 Q50

Question 18 (1 MARK)

How could Jo use the method of loci to memorise the order of the burger?

- A. By writing down the order of the burger.
- B. By visualising the ingredients of the burger on a familiar route and mentally walking this route to retrieve the order of the burger.
- C. By using the first letter of each ingredient to create a rhyming poem.
- D. By mentally repeating the order of burger ingredients in her head.

Question 19 (1 MARK)

An acrostic is an effective tool for Jo remembering the order of ingredients because

- A. visualising new information in familiar places adds meaning and enhances encoding in procedural memory.
- B. linking new information to familiar phrases adds meaning and enhances encoding in explicit memory.
- C. visualising new information in familiar places adds meaning and enhances encoding in explicit memory.
- D. linking new information to familiar phrases adds meaning and enhances encoding in procedural memory.

Adapted from VCAA Psychology exam 2015 Q51

Question 20 (6 MARKS)

Before Loki goes to work, he has a lot of things to do. Loki has to remember to water his plants, pack his lunch, drop his suit off at the dry cleaners, and fill up his car with petrol. The night before, Loki fears he will forget to do one of these things.

Explain how Loki can use the method of loci technique to help him remember his list of things to do.

Questions from multiple lessons

Question 21 (5 MARKS)

Dr Anastasia wants to investigate whether an acrostic or an acronym is more effective in remembering a list of countries. Dr Anastasia conducts an experiment with 30 participants. She splits the participants into two groups and presents them with a list of countries. Participants in Group A are instructed to use an acrostic to remember the list of countries while participants in Group B are instructed to use an acronym to remember the list of countries.

- a. What is the independent and dependent variable in this experiment? (2 MARKS)
- b. Identify what type of memory is being investigated in this experiment. (1 MARK)
- c. How may mnemonics be effective in encoding and retrieving this type of memory? (2 MARKS)

Chapter 5 review

Chapter summary

This chapter was all about the psychobiological process of memory. You learnt that memory is a complex concept involving many different processes, brain regions, and strategies.

In lesson **5A Atkinson-Shiffrin multi-store model of memory**, you learnt about the memory processes of encoding, storage, and retrieval. In particular, you learnt about how these processes interact with the three memory stores, these are:

- sensory memory
- short-term memory
- long-term memory.

In lesson **5B Brain structures involved in memory**, you learnt about the different types of long-term memory and the brain regions involved in the encoding and storage of these memories. In particular, you learnt about:

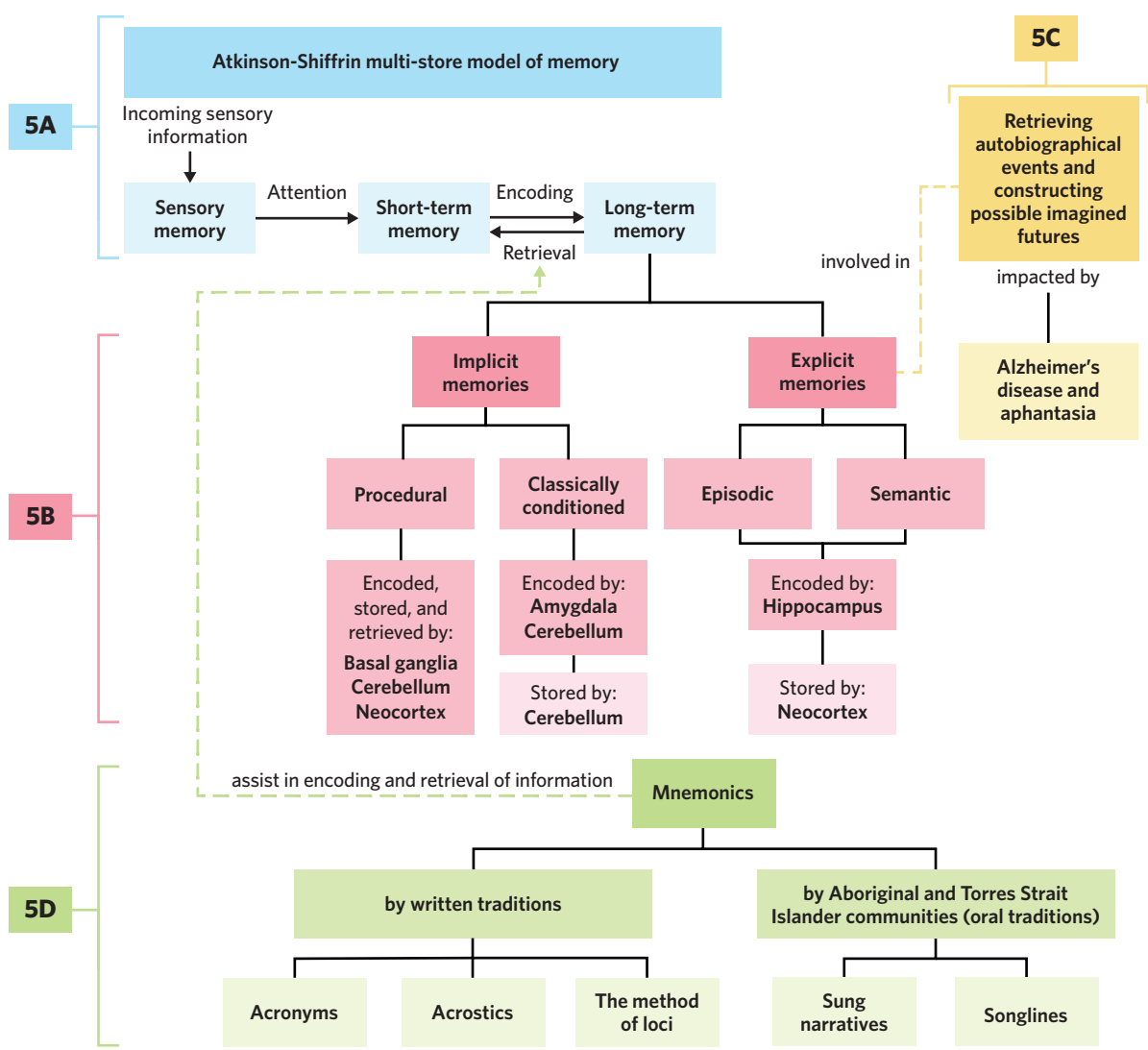
- explicit memory, including;
 - episodic memory
 - semantic memory.
- implicit memory, including;
 - procedural memory
 - classically conditioned memory.
- brain structures involved in long-term memory, including;
 - hippocampus
 - amygdala
 - neocortex
 - basal ganglia
 - cerebellum.

In lesson **5C The role of episodic and semantic memory in remembering and imagining**, you learnt about the functions of episodic and semantic memory in retrieving information and imagining, as well as the impact of Alzheimer's disease and aphantasia on these functions. In particular, you learnt about:

- retrieving autobiographical events
- constructing possible imagined futures
- Alzheimer's disease
- aphantasia.

In lesson **5D Mnemonics**, you learnt about different mnemonic devices associated with written and oral traditions and how these mnemonics aid the encoding, storage, and retrieval of information. In particular, you learnt about:

- acronyms
- acrostics
- the method of loci
- Sung narratives
- Songlines.



Chapter review activities

Review activity 1: Create your own mnemonics

In this chapter, you have learnt about mnemonics as strategies that aid the encoding, storage, and retrieval of information. For example, the phrase 'Memory Needs Every Method Of Nurturing Its Capacity' is an acrostic to help you remember the spelling and function of mnemonic devices. Try to come up with your own ways to remember the concepts covered in this chapter using mnemonic devices.

| Things to turn into a mnemonic: | Your mnemonics: |
|--|-----------------|
| The memory stores and processes involved in the Atkinson-Shiffrin multi-store model of memory. Need help? You can use the letters SASELR for 'Sensory, Attention, Short-term memory, Encoding, Long-term memory, and Retrieval' to make an acrostic or acronym. | |
| The different types of long-term memories. | |
| The brain regions (hippocampus, amygdala, neocortex, basal ganglia, cerebellum) involved in the storage of long-term memories. | |
| Mnemonics used by written traditions (acronyms, acrostics, and the method of loci) and Aboriginal and Torres Strait Islander communities' oral traditions (Sung narrative and Songlines). | |

Review activity 2: Fill in the blanks

Fill in the blanks with the following terms:

- episodic memory
- cerebellum
- stored
- semantic memory
- long-term memory
- autobiographical events
- explicit memories
- Alzheimer's disease
- short-term memory
- encoded
- lesions
- possible imagined future
- hippocampus
- retrieving
- procedural memory
- post-mortem examination

Suzy is an 84-year-old grandmother. Recently, Suzy's daughter Lina has been concerned by her inability to remember any new information. This means that information is not being _____ from her _____ to her _____. Lina took Suzy to a doctor, who reported to the family that she suspected Suzy was in the early stages of _____. The doctor could not provide a conclusive diagnosis of the disease as it can only be made through a _____ in which _____ are detected. However, a brain scan showed a depletion of neurons in the _____.

Because of her disease, Suzy also has trouble retrieving memories of _____, such as her last birthday party and what she did last weekend. However, Suzy still remembers how to knit and always knits blankets and scarves for her grandchildren. Suzy's memory of knitting is a _____ which has been encoded and _____ in her _____.

Lina is planning on throwing Suzy a party for her 85th birthday. Lina remembers that Suzy loved her last birthday as it was a surprise party and Suzy was overjoyed by the surprise, which is an example of a _____. Lina also remembers that there were 40 people at her birthday party, which is an example of a _____. By _____ both of these _____, she constructs a _____ for the party, by picturing a surprise party with the same number of guests.

Chapter 5 test

Multiple choice

Question 1 (1 MARK)

Information that is not attended to

- A. cannot be encoded by the amygdala.
- B. will not move to short-term memory and into conscious awareness.
- C. will be stored in long-term memory.
- D. will not move to short-term memory and into unconscious awareness.

Question 2 (1 MARK)

Bailey was conditioned to produce a fear response to his politics textbook. The type of memory this fear response represents and the region of Bailey's brain responsible for its consolidation are

- A. explicit memory and the cerebellum, respectively.
- B. procedural memory and the hippocampus, respectively.
- C. implicit memory and the amygdala, respectively.
- D. explicit memory and the neocortex, respectively.

Adapted from VCAA Psychology exam 2017 Q24

Question 3 (1 MARK)

Which of the following is an important component of both the method of loci and Songline mnemonic devices?

- A. Use of singing and rhythm.
- B. Use of letters.
- C. Hearing music.
- D. Visualisation of places.

Adapted from VCAA Psychology exam 2012 Q38

Use the following information to answer questions 4 and 5.

Rosie's grandmother Evelyn has been experiencing symptoms of memory loss for the past year. One symptom that stood out to Rosie was that she could not remember any new information that was told to her.

Question 4 (1 MARK)

Evelyn's inability to remember any new information demonstrates that she

- A. has had brain surgery.
- B. may have Alzheimer's disease.
- C. has aphantasia.
- D. has no episodic memory.

Question 5 (1 MARK)

Which region of Evelyn's brain would likely experience the greatest loss of neurons, given her symptoms?

- A. Cerebellum.
- B. Hippocampus.
- C. Neocortex.
- D. Amygdala.

Short answer**Question 6** (9 MARKS)

Dr Carey wanted to conduct a study investigating the effects of brain trauma on adults. To do this, she wanted to surgically damage the hippocampus of participants and interview them every three weeks, asking questions on how the surgery impacted their everyday lives. An ethics committee denied the research study due to it being unethical.

- a. Identify the type of data which Dr Carey would have recorded. (1 MARK)
- b. Outline which type of long-term memory would be impacted by damage to the hippocampus. Justify your response. (2 MARKS)
- c. Explain one ethical concept which Dr Carey's research would violate. Justify your response. (2 MARKS)
- d. Dr Carey has decided to instead investigate the role of specific regions of the brain in the storage of long-term memories. For the study, she plans to recruit a total of 18 participants. Group A will consist of 6 participants who have sustained damage to the amygdala in both hemispheres. Group B will consist of 6 participants who have damage to their neocortex. Group C will consist of 6 healthy participants with no damage to any brain regions. The study will consist of two stages. In stage one, Dr Carey will use a classic fear conditioning method, during which a neutral green square is paired with a very loud noise. The very loud noise is designed to produce a physiological arousal response suggestive of fear. In stage two, the participants will be presented with the green square on its own and Dr Carey will record the participants' heart rate in beats per minute to measure their fear response. Predict the likely results for Group A and Group B in the second stage of this experiment. Justify your response. (4 MARKS)

Adapted from VCAA Psychology trial exam 2019 Q7c

Question 7 (10 MARKS)

Meryl is auditioning for the lead role in her school's musical. For the audition, Meryl has to learn the lyrics of a song. She also has to perform a few steps of the dance routine that accompanies the song. Last time Meryl had to perform a dance routine at an audition, she felt very nervous. She remembered that focusing on a spot on the back wall of the audition room helped her focus.

- Meryl has to perform the steps of a dance routine. What type of long-term memory is this an example of? (1 MARK)
- Describe the role of the cerebellum in memory. (1 MARK)
- Outline the difference between semantic and episodic long-term memory, and provide an example of each. (3 MARKS)
- Suggest a possible imagined future Meryl could construct about the audition, and explain the role of episodic and semantic memory in constructing this possible imagined future. (3 MARKS)
- Idina is also auditioning for the lead role of the musical. Idina has chosen to recite a scene from the play as opposed to performing a musical number. Idina has aphantasia and is struggling to imagine how she would perform the scene at the audition, even though she has rehearsed the blocking multiple times in her bedroom. With reference to aphantasia, why might Idina struggle to construct a possible imagined future? Justify your response. (2 MARKS)

Question 8 (5 MARKS)

Annifred must remember to buy the following school supplies: eraser, pencil, sharpener, ruler, scissors.

- Give an example of an acrostic and an acronym that would help her remember what she needs to buy. (2 MARKS)

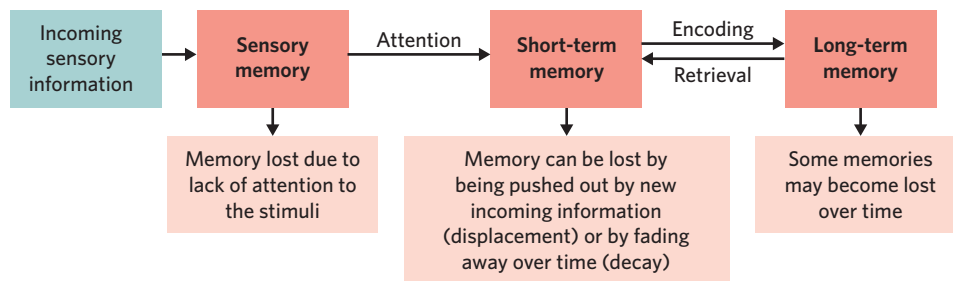
Adapted from VCAA Psychology exam 2014 Q7a

- Describe how acrostics and acronyms assist in retrieving information from memory. (3 MARKS)

Adapted from VCAA Psychology exam 2014 Q7b

Question 9 (10 MARKS)

The multi-store model of memory was first proposed by Atkinson and Shiffrin (1968)



Discuss how the Atkinson-Shiffrin multi-store model of memory and other concepts related to memory as a psychobiological process can be used together to explain the formation and retrieval of the memory of a person's day at the beach.

Adapted from VCAA Psychology exam 2019 Q8

Unit 3 AOS 2 review

The VCE study design outlines that, upon completion of this area of study, you must be able to 'apply different approaches to explain learning to familiar and novel contexts and discuss memory as a psychobiological process.'

SAC assessment 1

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Refer to the following logbook activities to answer the questions in this practice SAC.

Activity 1: Classical conditioning

Aim

To investigate the process of learning through classical conditioning.

Materials

- Bell
- Wizz Fizz (or any powdered candy)
- Spoon
- Timer
- 3 different alarm tones

Method

1. In a group of three, assign the following roles:
 - experimenter
 - participant
 - observer
2. The experimenter and participant sit opposite to each other, with the observer sitting next to the experimenter with a clear view of the participant.
3. Prior to trials, the experimenter rings the bell several times at irregular intervals without presenting any Wizz Fizz.
4. In trials 1–15, the experimenter rings the bell first and then, the participant takes a spoonful of Wizz Fizz within 3 seconds. (**Note:** the trials should be done at irregular intervals within a time period of 90 seconds)
5. In trials 16–25, the experimenter rings the bell but the participant does not take a spoonful of Wizz Fizz. Participant nods to indicate if salivation occurs.
6. Swap roles and repeat.

Results

Record how many times each participant salivated in trials 16–25, when the bell was sounded without the presentation of Wizz Fizz.

Activity 2: Operant conditioning

Aim

To investigate the process of learning through operant conditioning.

Materials

- N/A

Method

1. Select two student volunteers and ask them to exit the classroom.
2. Those remaining in the class decide on an object that the volunteers have to pick up upon coming back, such as a particular textbook.
3. Invite the first volunteer back to the classroom and without speaking, guide the volunteer to the decided object.
4. If the volunteer gets closer to the decided object, the entire class will clap, with clapping continuing if the volunteer moves even closer to the decided object. However, if the volunteer moves away from the decided object, the entire class will stop clapping and sit in silence.
5. Once the volunteer had picked up the decided object, debrief them on the experiment's aim.

Activity 3: Observational learning

Aim

To investigate and demonstrate observational learning.

Materials

- gloves
- a device connected to the Internet
- an even number of participants.

Method

1. On YouTube search for 'Learn Super Cool "Secret" Handshake' (Haley Dempsey, 2012) and watch the forty-six second video. Watch the video two times.
2. Turn to the person next to you and attempt to do this handshake that was shown in the video. Gloves may be worn to make this activity COVID-safe.
3. Rewatch the video and see whether you and your partner were successfully able to complete the handshake.
4. In the results table, record:
 - the number of pairs of participants who were successfully able to complete the handshake.
 - the number of pairs of participants who were not successfully able to complete the handshake.

Question 1 (8 MARKS)

The role of the learner (or participant) in each of the experiments slightly differed.

- a. Place a cross to indicate whether the learner/participant had an active or passive role in each of the activities. (3 MARKS)

| Role of learner/ participant | Classical conditioning | Operant conditioning | Observational learning |
|------------------------------|------------------------|----------------------|------------------------|
| Active | | | |
| Passive | | | |

- b. Outline whether the behaviour in each of the activities was voluntary or involuntary. (3 MARKS)
- c. With reference to the role of a learner and the nature of behaviour, suggest which method of learning is most similar to Aboriginal and Torres Strait Islander approaches to learning. (2 MARKS)

Question 2 (5 MARKS)

Outline the similarities and differences between the processes of learning demonstrated in Activity 1 and Activity 2.

Question 3 (8 MARKS)

Aboriginal and Torres Strait Islander approaches to learning occur in a similar way to the approach used in Activity 3.

- Identify and explain a similarity between Aboriginal and Torres Strait Islander approaches to learning and observational learning. (3 MARKS)
 - When learning how to crack an egg using a YouTube video, suggest how an individual may demonstrate observational learning. (5 MARKS)
-

Question 4 (8 MARKS)

Activity 1 and Activity 2 both investigated behaviourist approaches to learning.

- Explain how an association was learnt in Activity 1. (4 MARKS)
 - Identify and describe the process of learning demonstrated in Activity 2. (4 MARKS)
-

Question 5 (7 MARKS)

Evaluate whether the other learning methods — classical conditioning and observational learning — would have been effective in the experiment carried out in Activity 2. If they would not have been, justify why operant conditioning was the most effective to produce the desired response.

Question 6 (4 MARKS)

Explain two of the elements of Aboriginal and Torres Strait Islander approaches to learning that make it unique and distinct from the other approaches to learning reflected in the activities.

Unit 3 AOS 2 review

SAC assessment 2

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 1-5.

Case study: Poor working memory

Danny is a five-year-old boy who has recently started Prep. Although he does not appear to be developmentally different from his peers, his mother, Eva, noticed some concerning behaviours arising.

After his first day of Prep, Eva asked Danny about his day and how it went. She wanted to know who he had met that day, what he had learnt, and how he felt about the year up ahead. But much to her dismay, Danny struggled greatly to recall any details about what he did on his first day of school. He also struggled to imagine how the following day would be, to remember how he had felt that day, and to recall the names of students he had met. Even after several weeks of being in the same class, Danny struggled to remember the names of the students in his class. When working in small groups, such as a group of three, he often forgot the names of his peers within seconds and had to ask them to remind him of their names.

Even after a month of Prep, Danny could not remember where his classroom was. Danny often ended up in a corner of the school and had to have teachers guide him back to his classroom every morning, as well as after recess and lunchtime, despite all Prep classrooms being located in the middle of the school and Danny being able to visualise how his classroom looks.

Danny also found it difficult to remember the morning routine that his teacher had created for him. The morning routine consisted of students putting their bags into their pigeon holes, changing their daily reading book, putting their reading diary into their teacher's basket, and checking their individual tubs for the first worksheet of the day. Danny often forgot to put his reading diary into his teacher's basket, causing him to get into trouble.

Feeling that something was wrong, Eva pushed for an assessment with the school occupational therapist who confirmed that Danny's working memory was substantially weak for his age. Although this was a relief, it meant that Eva and Danny had a daunting and difficult task to overcome.

Question 1 (5 MARKS)

Danny being unable to recall his first day of Prep thoroughly alarmed and worried his mother, Eva.

- Using an example, identify and describe what type of memory Danny failed to recall on his first day of Prep. (3 MARKS)
- Propose why Danny may have been unable to imagine his next day at school. (2 MARKS)

Question 2 (12 MARKS)

Danny has to work in a group with Amelia, Rafa, Toby, Sheron, and Yaakov for an art project.

- In terms of encoding, how may using mnemonics be useful for Danny? (2 MARKS)
- Propose how Danny could use acronyms and acrostics to remember the names of students in his art project group. (4 MARKS)
- Using the method of loci, suggest how Danny could remember the morning routine that his teacher had created for the class. (6 MARKS)

Question 3 (13 MARKS)

Danny's struggle to remember the names of people in his class can be explained using the Atkinson-Shiffrin multi-store model of memory.

- a. With reference to encoding and storage, evaluate the functioning of Danny's short-term memory store. (3 MARKS)
- b. With reference to the Atkinson-Shiffrin multi-store model of memory, compare how Danny's memory processing may differ from another student in his class who does not experience memory problems. (6 MARKS)
- c. With reference to Danny's situation, evaluate the explanatory power of the Atkinson-Shiffrin multi-store model of memory. (4 MARKS)

Question 4 (6 MARKS)

Following Danny's assessment, the school occupational therapist also suggested that Danny may struggle with long-term memory due to possible damage to his brain.

- a. With reference to two brain structures involved in memory, propose why Danny cannot remember where his classroom is located if these areas were damaged. (4 MARKS)
- b. The occupational therapist suspected that Danny's amygdala may be damaged. With reference to Danny's inability to remember how he felt on his first day of Prep, justify if this suspicion is accurate. (2 MARKS)

Question 5 (4 MARKS)

During Danny's assessment, the school occupational therapist ruled out the possibility of Danny having aphantasia or Alzheimer's disease. Justify why this might have happened.



4

UNIT 4

How is mental wellbeing supported and maintained?

In this unit students explore the demand for sleep and the influences of sleep on mental wellbeing. They consider the biological mechanisms that regulate sleep and the relationship between rapid eye movement (REM) and non-rapid eye movement (NREM) sleep across the life span. They also study the impact that changes to a person's sleep-wake cycle and sleep hygiene have on a person's psychological functioning and consider the contribution that classical and contemporary research has made to the understanding of sleep.

Students consider ways in which mental wellbeing may be defined and conceptualised, including social and emotional wellbeing (SEWB) as a multidimensional and holistic framework to wellbeing. They explore the concept of mental wellbeing as a continuum and apply a biopsychosocial approach, as a scientific model, to understand specific phobia. They explore how mental wellbeing can be supported by considering the importance of biopsychosocial protective factors and cultural determinants as integral to the wellbeing of Aboriginal and Torres Strait Islander peoples.

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UNIT 4 AOS 1

How does sleep affect mental processes and behaviour?

In this area of study students focus on sleep as an example of an altered state of consciousness and the different demands humans have for sleep across the life span. They compare REM and NREM sleep as examples of naturally occurring altered states of consciousness and investigate the biological mechanisms of the sleep-wake cycle in terms of the timing of sleep, what causes individuals to be sleepy at night and why individuals wake when required.

Students analyse the effects of sleep deprivation on psychological functioning, including emotional, behavioural and cognitive functioning. They compare the effects of total sleep deprivation and blood alcohol concentration readings of 0.05 and 0.10 in terms of affective and cognitive functioning. Students examine circadian rhythm disorders as the result of changes to an individual's sleep-wake cycle and apply their knowledge regarding sleep hygiene and zeitgebers to suggest ways to improve the sleep-wake cycle and mental wellbeing.

Outcome 1

On completion of this unit the student should be able to analyse the demand for sleep and evaluate the effects of sleep disruption on a person's psychological functioning.

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6



CHAPTER 6

The demand for sleep

LESSONS

- 6A** Sleep as a psychological construct
- 6B** Measuring sleep
- 6C** Regulation of sleep-wake patterns
- 6D** Sleep across the lifespan

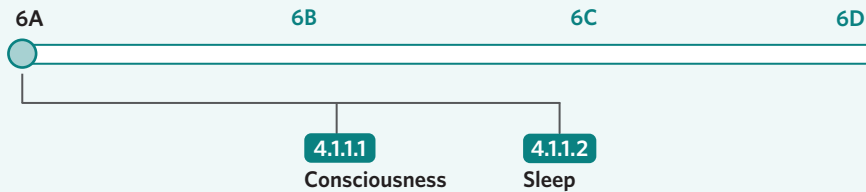
KEY KNOWLEDGE

- sleep as a psychological construct that is broadly categorised as a naturally occurring altered state of consciousness and is further categorised into REM and NREM sleep, and the measurement of physiological responses associated with sleep, through electroencephalography (EEG), electromyography (EMG), electro-oculography (EOG), sleep diaries and video monitoring
- regulation of sleep-wake patterns by internal biological mechanisms, with reference to circadian rhythm, ultradian rhythms of REM and NREM Stages 1-3, the suprachiasmatic nucleus and melatonin
- differences in, and explanations for, the demands for sleep across the life span, with reference to total amount of sleep and changes in a typical pattern of sleep (proportion of REM and NREM)

6A Sleep as a psychological construct

STUDY DESIGN DOT POINT

- sleep as a psychological construct that is broadly categorised as a naturally occurring altered state of consciousness and is further categorised into REM and NREM sleep, and the measurement of physiological responses associated with sleep, through electroencephalography (EEG), electromyography (EMG), electro-oculography (EOG), sleep diaries and video monitoring



The average person spends approximately 26 years of their life asleep (Curtis, 2021). Although we spend so much time sleeping, what actually happens whilst we are asleep remains a mystery. In this lesson, you will learn about sleep as a psychological construct. First, you will learn about consciousness and how it relates to sleep. Then, you will learn about sleep and the different types and stages of sleep.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Consciousness 4.1.1.1

In order to understand sleep as a psychological construct, it is important to understand consciousness as a psychological construct. Therefore, in this section of the lesson, we will learn about consciousness.

Theory details

Consciousness is the level of awareness an individual has over their thoughts, feelings, perceptions, and existence. Consciousness is a psychological construct. A **psychological construct** is an agreed upon description and understanding of psychological phenomena that cannot be overtly (directly) measured or observed. In this way, a person cannot directly observe or measure consciousness, but rather it needs to be inferred from other measures, such as brain wave patterns, which you will learn about in the next lesson.

Consciousness can be divided into two different types of consciousness: normal waking consciousness (NWC) and altered states of consciousness (ASC). **Normal waking consciousness (NWC)** is a state of consciousness in which an individual is awake and aware. By contrast, an **altered state of consciousness (ASC)** is a state of consciousness that is distinctly different from normal waking consciousness in terms of quality of experience and levels of awareness. Altered states of consciousness can be further categorised into induced or naturally occurring. Table 1 explores these two types of altered states of consciousness.

Table 1 Naturally occurring and induced altered states of consciousness

| | Definition | Example |
|--|---|---|
| Naturally occurring altered state of consciousness | A type of altered state of consciousness that occurs without intervention. | Sleep, daydreaming |
| Induced altered state of consciousness | A type of altered state of consciousness that occurs due to a purposeful action or aid. | Meditation, hypnosis, influence of alcohol and/or drugs |

KEY TERMS

Consciousness the level of awareness an individual has of their thoughts, feelings, perceptions, and existence

Psychological construct an agreed upon description and understanding of psychological phenomena that cannot be overtly measured or observed

Normal waking consciousness (NWC) a state of consciousness in which an individual is awake and aware

Altered state of consciousness (ASC) a state of consciousness that is distinctly different from normal waking consciousness in terms of quality of experience and levels of awareness

Consciousness can be reflected by a continuum. The **consciousness continuum** is a visual representation of the different states of consciousness that progress from lower levels of awareness to higher levels of awareness. Within the consciousness continuum, the two different types of consciousness (ASC and NWC) are presented. It is important to note that there are many ways to conceptualise the consciousness continuum and figure 1 presents an example of the consciousness continuum.

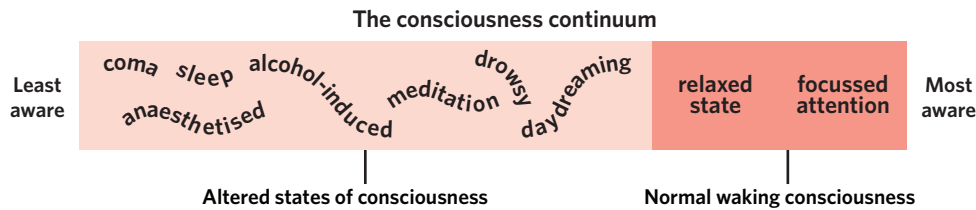


Figure 1 The consciousness continuum

Sleep 4.1.1.2

In this section of the lesson, we will learn about sleep as a psychological construct and an altered state of consciousness.

Theory details

Sleep is a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli. Sleep can also be considered a psychological construct. This is because the subjective experience of sleep cannot be overtly measured, yet we still have a general understanding of what it is and that it exists.

Characteristics of sleep include:

- a reduced ability to control behaviour
- a reduction in the control we have over thoughts, for example, we lack control over what we dream about
- less accurate understanding of the passage of time
- perceptual and cognitive distortions.

Sleep is divided into two different types of sleep. These are rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep. **REM (rapid eye movement) sleep** is a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity. Specifically, REM sleep involves low levels of somatic nervous system activity, meaning there are low levels of movement in this stage. **NREM (non-rapid eye movement) sleep** is a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages.

A **sleep episode** is the full duration of time spent asleep. A sleep episode is made up of multiple repeated cycles of REM and NREM sleep, called sleep cycles. Therefore, a **sleep cycle** is an approximately 90-minute-period that repeats during a sleep episode in which an individual progresses through stages of REM and NREM sleep. Figure 2 presents a hypnogram, which is a sleep graph that tracks the proportion of time spent in each stage of sleep, including awakenings, throughout a sleep episode. In this hypnogram, the different types of sleep (REM and NREM) and the different NREM stages (NREM 1–3) within each sleep cycle are visualised.

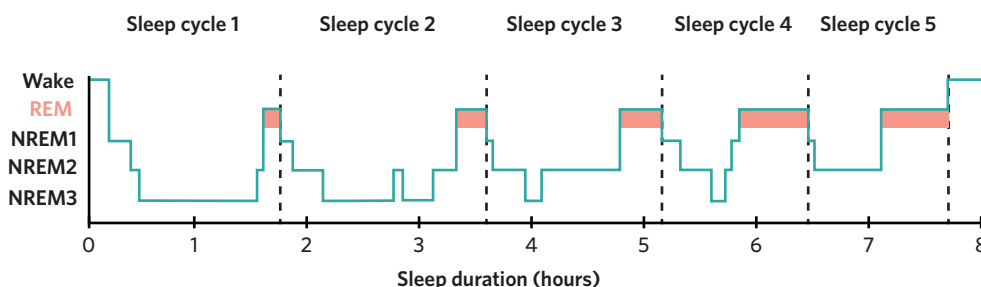


Figure 2 A typical hypnogram for an average adult's sleep episode

There are specific characteristics that distinguish REM and NREM sleep, as well as the substages of NREM sleep. These are depicted in table 2 and table 3.

Naturally occurring altered states of consciousness a type of altered state of consciousness that occurs without intervention

Induced altered states of consciousness a type of altered state of consciousness that occurs due to a purposeful action or aid

Consciousness continuum a visual representation of the different states of consciousness that progress from lower levels of awareness to higher levels of awareness

Sleep a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli

REM (rapid eye movement) sleep a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity

NREM (non-rapid eye movement) sleep a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages

Sleep episode the full duration of time spent asleep

Sleep cycle an approximately 90-minute-period that repeats during a sleep episode in which an individual progresses through stages of REM and NREM sleep

Table 2 Characteristics of REM and NREM sleep

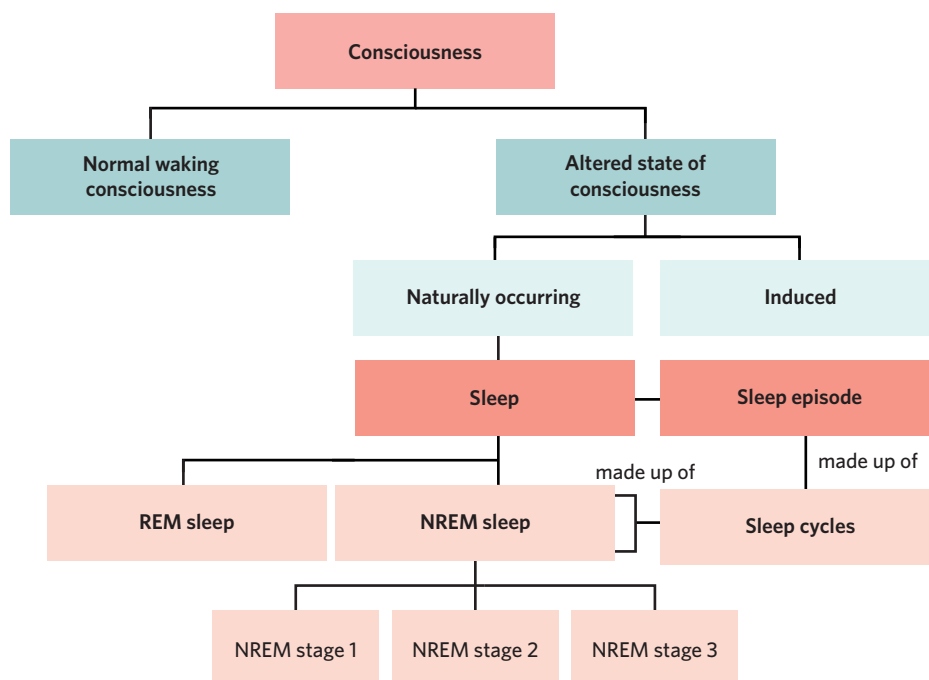
| Characteristics of REM sleep | Characteristics of NREM sleep |
|--|---|
| <ul style="list-style-type: none"> The sleeper is considered to have a highly active brain and a less active body during REM sleep. The sleeper is virtually paralysed during REM sleep, meaning that most muscle movement is not possible. REM is a relatively light stage of sleep; despite the muscle paralysis, the brain is active and sleepers can be woken fairly easily. Vivid dreaming tends to occur during REM sleep. The sleeper frequently recalls dreams when woken during REM sleep. REM sleep makes up approximately 20–25% of a sleep episode for most age groups. The amount of time spent in REM sleep increases as the sleep episode progresses, with the largest amount of REM in the sleep cycle occurring immediately before waking. Early in the night, REM sleep may only last a few minutes, but later during the night, it can last up to an hour. | <ul style="list-style-type: none"> The sleeper is considered to have a less active brain than normal waking consciousness. As opposed to REM sleep, physical movement is possible in NREM sleep, therefore the body is said to be ‘more active’ in this stage of sleep. However, movement tends to decrease as NREM stages progress. Muscle movement is possible for the sleeper during NREM sleep. Dreams can occur in NREM sleep but they are often non-vivid (as opposed to REM sleep). The sleeper does not frequently recall dreams when woken during NREM sleep. The amount of time spent in NREM sleep is highest during the first half of a sleep episode. NREM sleep makes up approximately 75–80% of a sleep episode. NREM sleep tends to become shorter with each sleep cycle. NREM sleep is subdivided into three stages. These are explored in table 3. |

Table 3 The three stages of NREM sleep

| NREM stage 1 | NREM stage 2 | NREM stage 3 |
|---|---|---|
| When moving into stage 1 of NREM sleep, the sleeper transitions from being awake into a light sleep. This transition is signified by the experience of the hypnagogic state, in which some people experience feelings of floating or falling, or a sudden jerk (referred to as a hypnic jerk). In this stage, the sleeper loses awareness of themselves and their surroundings but is still aware of faint sounds in the environment. The sleeper can be easily woken in stage 1. | In stage 2 of NREM sleep, the sleeper is still in a relatively light sleep. Individuals spend the majority of their time asleep in NREM stage 2. In this stage, the sleeper is considered ‘truly’ asleep, due to the types of brain waves occurring. Brain waves are explored in the next lesson. | In stage 3 of NREM sleep, the sleeper is in a deep stage of sleep. It is difficult to wake the sleeper in this stage of NREM. If the sleeper is woken during this stage they are likely to feel drowsy and disoriented. During this stage, sleepwalking and sleep talking are most likely to occur. |

Theory summary

In this lesson, you learnt about consciousness and sleep. Figure 3 presents a summary of this lesson.

**Figure 3** Summary of lesson 6A

6A Questions

Theory review

Question 1

Consciousness is fixed and never changes.

- A. True.
- B. False.

Question 2

Which of the following is true of sleep? **(Select all that apply)**

- I. Sleep is an altered state of consciousness.
- II. Sleep is naturally occurring.
- III. There are different types of sleep.

Question 3

Sleep can be divided into REM, NREM, and normal waking sleep.

- A. True.
- B. False.

Question 4

The brain is active during REM sleep.

- A. True.
- B. False.

Question 5

NREM sleep is divided into _____ substages.

Which of the following best fills in the blank?

- A. two
- B. three
- C. four

Assessment skills

Perfect your phrasing

Question 6

Which of the following is most correct?

- A. Sleep is a regular and naturally occurring altered state of consciousness that involves a loss of **awareness** and **disengagement** with internal and external stimuli.
- B. Sleep is a regular and naturally occurring altered state of consciousness that involves a loss of **knowledge** and **communication** with internal and external stimuli.

Question 7

Which of the following is most correct?

- A. REM sleep is characterised by rapid eye movement, high levels of **cognitive functioning**, and low levels of **physical** activity.
- B. REM sleep is characterised by rapid eye movement, high levels of **brain activity**, and low levels of **biological** activity.

Question 8

Which of the following is most correct?

- A. NREM sleep is characterised by a **lack of regular eye movement** and is subdivided into three different stages.
- B. NREM sleep is characterised by a **lack of rapid eye movement** and is subdivided into three different stages.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 9

Which of the following describes a difference between REM and NREM sleep?

- A. The sleeper is considered to have a less active brain during REM sleep and active brain during NREM sleep.
- B. The body is less physically active during REM sleep whereas physical activity is possible during NREM sleep.
- C. REM sleep makes up approximately 75–80% of sleep, whilst NREM sleep makes up 20–25% of sleep.
- D. Dreaming does not occur in REM sleep but it often occurs in NREM sleep.

Question 10

NREM stage 1 and NREM stage 3 both involve

- A. deep sleep.
- B. an active brain.
- C. a less active brain than normal waking consciousness.
- D. sleepwalking.

Question 11

Sleep is different from being awake because

- A. sleep is a state of normal waking consciousness whereas being awake is an altered state of consciousness.
- B. sleep involves a more accurate understanding of time, whereas being awake involves a less accurate understanding of time.
- C. being awake involves being conscious, and consciousness is not a psychological construct, whereas sleep is a psychological construct.
- D. being awake is a state of normal waking consciousness whereas being asleep is an altered state of consciousness.

Exam-style

Remember and understand

Question 12 (1 MARK)

Sleep is

- A. a regular and induced state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli.
- B. a repeated and normal waking state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli.
- C. a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli.
- D. a regular and naturally occurring altered state of consciousness that involves a loss of awareness and increased engagement with internal and external stimuli.

Question 13 (1 MARK)

As a sleep episode progresses, the likelihood of being in NREM stage 3

- A. increases, while the likelihood of being in REM sleep decreases.
- B. decreases, while the likelihood of being in REM sleep increases.
- C. increases, while the likelihood of being in REM sleep also increases.
- D. decreases, while the likelihood of being in REM sleep also decreases.

Question 14 (2 MARKS)

- a. Outline what is meant by a psychological construct. (1 MARK)
- b. Identify one example of a psychological construct. (1 MARK)

Question 15 (2 MARKS)

Identify two differences between rapid eye movement (REM) and non-rapid eye movement (NREM) sleep.

Question 16 (2 MARKS)

Describe NREM sleep.

Apply and analyse

Question 17 (1 MARK)

Kyle had family staying over at his house and his cousin Sophie had to sleep on the couch in the living room. In the middle of the night, Kyle had to walk past the living room to get a drink of water. Sophie was completely motionless but woke up when Kyle walked past her. When Kyle spoke to Sophie she could tell him all of the details of her dream.

Prior to being woken up, Sophie was most likely in

- A. stage 3 non-rapid eye movement (NREM) sleep.
- B. stage 4 NREM sleep.
- C. rapid eye movement (REM) sleep.
- D. stage 2 NREM sleep.

Question 18 (2 MARKS)

Fredrick fell asleep on the couch after he came home from school. When it was time for him to wake up for dinner, his sister Alex was concerned by how motionless Fredrick appeared in his sleep. He was not tossing or turning at all, instead appearing completely still.

What stage of sleep is Fredrick most likely in? Justify your response.

Question 19 (12 MARKS)

Rory, Andrew, and Jaimie were learning about meditation in their psychology class. Their teacher began the class by playing a fifteen-minute guided meditation for the students to follow along with. Rory practised the meditation, but Andrew was distracted by notifications on his phone and was responding to a text he had received. Jaimie ended up falling asleep briefly for about ten minutes but they woke up easily when the teacher started talking loudly.

- a. Identify the state of consciousness Jaimie was likely to be experiencing. (1 MARK)
- b. Describe the type of sleep that Jaimie would likely to be moving into when transitioning from being awake to being asleep. (2 MARKS)
- c. The psychology class runs for 1.5 hours. With reference to the different types of sleep, discuss the sleep episode Jaimie would likely have experienced if they remained asleep for the rest of the class. (5 MARKS)

- d. Their teacher noticed that many students concentrated better during the lessons that began with a guided meditation, but wanted to scientifically test whether or not her observation was correct.
- i. Write an operationalised independent and dependent variable that the teacher could use in her study. (2 MARKS)
 - ii. Identify and explain an extraneous or confounding variable that may impact the study. (2 MARKS)

Questions from multiple lessons

Question 20 (2 MARKS)

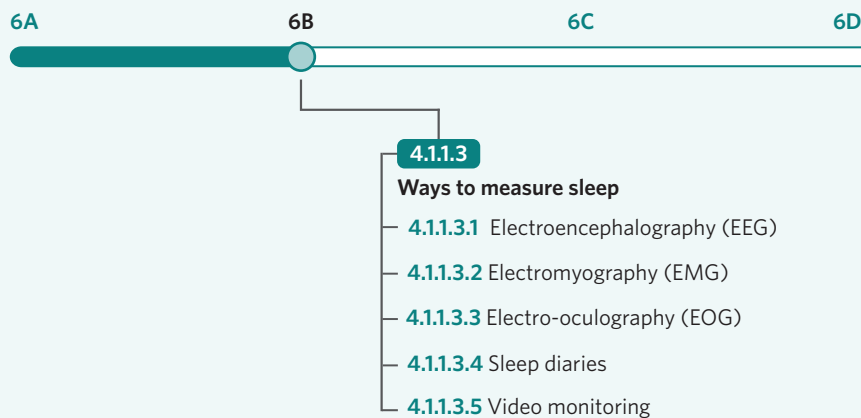
Physiological changes during rapid eye movement (REM) sleep include increased heart rate and blood pressure.

Describe the specific division of the nervous system that is responsible for these physiological changes.

6B Measuring sleep

STUDY DESIGN DOT POINT

- sleep as a psychological construct that is broadly categorised as a naturally occurring altered state of consciousness and is further categorised into REM and NREM sleep, and the measurement of physiological responses associated with sleep, through electroencephalography (EEG), electromyography (EMG), electro-oculography (EOG), sleep diaries and video monitoring



As smart watches and sleep measuring apps become more common, it is clear that we like to measure and examine the quality and quantity of sleep we have experienced. Tools to measure sleep can vary from these digital devices to more complex measures that can provide more detailed examinations of our sleep. In this lesson, you will learn about some of the different ways to measure sleep.



Ways to measure sleep 4.1.1.3

Often, we discuss our sleep experiences with other people, such as the number of hours we have slept for. Counting these hours is one way we can measure sleep. In this section of the lesson, you will learn about the various ways sleep can be measured.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Theory details

Sleep can be measured through investigating and measuring consciousness. As explored in the previous lesson, sleep is considered to be a naturally-occurring altered state of consciousness, so the changes that occur when an individual is in an altered state of consciousness are often similar to the changes that occur when an individual is asleep. Therefore, the measurements that are commonly used for consciousness can often be used to measure sleep as well. States of consciousness cannot be directly measured or observed, so they are inferred from other information instead, such as physiological responses or an individual's behaviour. Some ways this information can be gathered is through analysing the objective physiological changes that occur during sleep or exploring qualitative information about changes that occur during sleep.

Some of these measures of consciousness (and consequently sleep) include:

- the electroencephalograph (EEG)
- the electromyograph (EMG)
- the electro-oculograph (EOG)
- sleep diaries
- video monitoring.

EEGs, EMGs, and EOGs are considered to be objective physiological measures. This means that they provide reliable, unbiased, quantitative data that can indicate someone's state of consciousness. However, they do not provide qualitative detail about the personal experience of sleep, such as an individual's thoughts or feelings. Additionally, changes in physiological responses may be due to factors other than a change in consciousness, thus the findings may lack validity at times. In comparison, sleep diaries and video monitoring are considered to be subjective measures. This means that information is provided by an individual and is related to their personal experiences. In this way, subjective measures do not provide a direct observation and the accuracy and reliability of such measures can be limited due to their subjective nature. It is important to note that subjective measures can provide both qualitative and quantitative data. For example, a sleep diary can provide qualitative information about sleep, such as how an individual feels before going to sleep, but also quantitative information, such as how long an individual slept for. Both these types of information are considered subjective as they are based on the individual's personal experience.

Measuring sleep can be difficult as some techniques can be disruptive, invasive, or may require an individual to sleep in a sleep laboratory for a period of time. Changes to an individual's regular sleep patterns, such as having to record their sleep or having electrodes attached to their head whilst asleep, can influence the quality and quantity of an individual's sleep. Therefore, sleep measures may not provide a true reflection of an individual's usual sleeping patterns.

WANT TO KNOW MORE?

Subjective data can be inaccurate or unreliable at times. One reason why this may occur is due to the 'social desirability bias', in which people provide responses that they think will be viewed favourably by others, such as the researcher during a study. For example, this may mean that an individual who is embarrassed by how little they slept tells the researcher that they slept longer than they did and fail to provide information about behaviours they may have engaged in, such as drinking coffee right before bed.

USEFUL TIP

When answering a question about electroencephalographs, electromyographs, and electro-oculographs, it is a good idea to introduce the term in full and enclose the acronym in brackets the first time you mention it.

For example, if a question asks:

- Describe an electroencephalograph.

Your answer should include:

- An electroencephalograph (EEG) is a ... An EEG involves...

KEY TERMS

Electroencephalograph (EEG) a device that detects, amplifies, and records the electrical activity of the brain

Electroencephalography (EEG) 4.1.1.3.1

An **electroencephalograph (EEG)** is a device that detects, amplifies, and records the electrical activity of the brain. When neurons communicate, they emit electrical impulses. These impulses are detected by the EEG and then presented as brain wave patterns. Brain waves can be used to make a judgement about the state of consciousness a person might be in, as different brain wave patterns correlate to different states of consciousness. In this way, the different stages of sleep can be correlated with particular brain wave patterns recorded by an EEG. In order to take these readings, a medical professional or researcher attaches electrodes to the outside of a person's head. This is shown in figure 1.



Figure 1 An EEG being used to detect, amplify, and record the electrical activity of the brain

Brain waves vary in frequency (rate) and amplitude (height). Frequency is the number of brain waves that occur per second, whilst amplitude is the intensity and height of the brain waves. The frequency and amplitude of brain waves can indicate what state of consciousness an individual is experiencing. Figure 2 visualises the frequency and amplitude of brain waves.

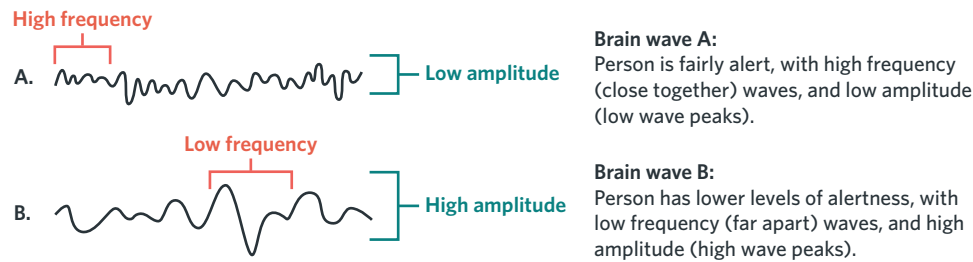


Figure 2 Brain waves and their frequency and amplitude

EEGs can indicate whether an individual might be in an altered state of consciousness and therefore whether they may be asleep. Often, an EEG will show a higher frequency and lower amplitude when in normal waking consciousness, and a lower frequency and higher amplitude during an altered state of consciousness.

Therefore, an EEG is likely to show:





- higher frequency and lower amplitude in REM sleep.
- high frequency and low amplitude in NREM sleep stage 1 (transitioning from wakefulness to sleep), but lower frequency and higher amplitude than normal-waking consciousness.
- medium frequency and medium amplitude in NREM sleep stage 2 (light sleep).
- lower frequency and higher amplitude in NREM sleep stage 3 (deep sleep).

A strength of EEGs as a measure of sleep is that it is useful for sleep studies or diagnoses of patients with brain damage or a neurological or mental disorder. However, a limitation of EEGs as a measure of sleep is that it measures neural activity underneath a thick and hard skull and thus is not entirely precise. It also does not pinpoint or identify functional or dysfunctional areas of the brain as well as neuroimaging techniques, such as an fMRI.

WANT TO KNOW MORE?

Brain waves can be classified into different types and these can be used to describe the different stages of sleep. Table 1 depicts the different types of brain waves.

Table 1 Type of brain waves

| Type of brain wave | Frequency | Amplitude |
|--|----------------------------|----------------------------|
| Beta  | High | Low |
| Alpha  | High (but lower than beta) | Low (but higher than beta) |
| Theta  | Medium | Medium-high |
| Delta  | Low | High |

During REM sleep, an EEG will show beta-like brain waves, as the brain is highly active in REM sleep. The types of brain waves shown in NREM sleep depend on the stage of NREM sleep. NREM sleep stage 1 will often show alpha-like brain waves, NREM stage 2 will often show theta-like brain waves. During NREM sleep stage 2, the sleeper is considered 'truly asleep'. EEG readings can reflect this by showing 'sleep spindles', which are brief bursts of high frequency waves which sleep researchers identify as the point where a sleeper is truly asleep. NREM stage 3 will often show delta-like brain waves.

USEFUL TIP

It is important to understand that EEGs measure electrical impulses that are then represented through brain waves. In this way, EEGs do not actually measure brain waves, but rather brain waves are used to describe the electrical activity of the brain. Therefore, you should say that EEG recordings show specific brain waves to represent the electrical activity of the brain, rather than that the brain shows specific brain waves.

Electromyograph

(EMG) a device that detects, amplifies, and records the electrical activity of the body's muscles

USEFUL TIP

You do not have to be able to read an EMG, but rather comment on the expected EMG reading in a given scenario. In order to do this, use the language 'low activity', 'medium activity,' or 'high activity'.

Electro-oculograph

(EOG) a device that detects, amplifies, and records the electrical activity of the muscles responsible for eye movement

USEFUL TIP

When describing the role of EEGs, EMGs, and EOGs, you must state that they detect, amplify, and record electrical activity, and specify where the electrical activity comes from.

In order to remember this, you can use the acronym DARE:

- detect,
- amplify,
- record
- electrical activity of...

Electromyography (EMG) 4.1.1.3.2

An **electromyograph (EMG)** is a device that detects, amplifies, and records the electrical activity of the body's muscles. By attaching electrodes to the skin above the muscles under investigation, the movement and tension of muscles are recorded. This is shown in figure 3.

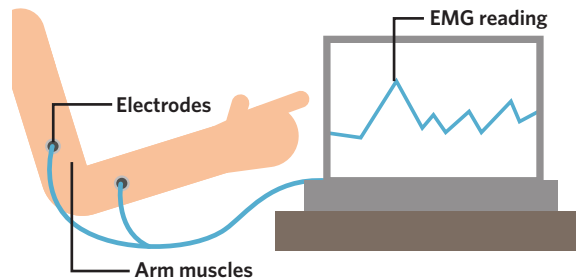


Figure 3 An EMG being used to detect, amplify, and record the electrical activity of the muscles

Muscle movement and tension can be used to identify the different stages and types of sleep an individual may be experiencing through gathering information about how active a person's muscles are. During REM sleep, EMG readings show low activity, due to there being low levels of physiological activity during this type of sleep. During NREM sleep, EMG readings show medium/moderate activity, due to there being some physiological activity during this type of sleep. However, as NREM sleep stages progress, an EMG is likely to show lower activity as movement is less likely to occur (although it is still possible).

Electro-oculography (EOG) 4.1.1.3.3

An **electro-oculograph (EOG)** is a device that detects, amplifies, and records the electrical activity of the muscles responsible for eye movement. The movement of these muscles, and therefore movement of the eyes, is measured by electrodes that are attached to the skin above the muscles. This is shown in figure 4.

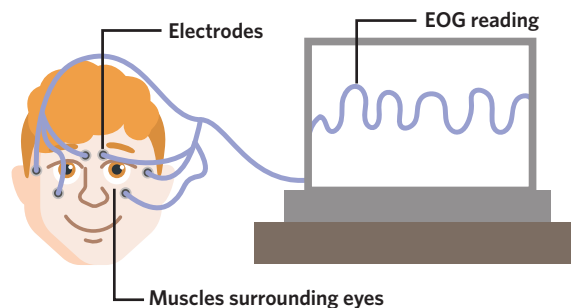


Figure 4 An EOG being used to detect, amplify, and record the electrical activity of the eye muscles

USEFUL TIP

Many students lose marks by simply stating that the EOG detects, amplifies, and records electrical activity of the eyes. This is not correct, because the EOG detects, amplifies, and records electrical activity of muscles surrounding the eyes, and uses this to infer eye movements. In order to gain full marks, it is essential that you state 'muscles surrounding the eyes'.

Eye movements, which are facilitated by the movements of muscles surrounding the eyes, are a physiological response that can be used to investigate the type of sleep a person is experiencing. One of the main distinguishing features of REM sleep and NREM sleep is eye movement. Therefore, EOGs are helpful in determining what type of sleep an individual is experiencing. During REM sleep, an individual experiences rapid eye movement, so an EOG is likely to show high activity. By comparison, during NREM sleep, an individual does not experience rapid eye movement, so an EOG is likely to show low activity.

Sleep diaries 4.1.1.3.4

Sleep diaries are a record containing self-reported descriptions from an individual about their sleeping periods, including an estimated time spent sleeping and judgements they might have about the quality and nature of their sleep. It can include both qualitative and quantitative information. This information is recorded over a period of time, most commonly a few weeks. This method is subjective and therefore can be less reliable than objective measures, such as EEGs, as individuals may not be able to determine the exact time they fell asleep or be able to remember the quality of their sleep upon waking.

Some of the information that can be recorded by an individual in a sleep diary include:

- the duration of sleep
- the quality of sleep
- thoughts and feelings before going to sleep
- thoughts and feelings after waking up
- behaviours before going to sleep
- behaviours after waking up
- the number of times sleep was disrupted.

Sleep diaries are beneficial as they provide qualitative information and therefore are often extensive in detail and description. However, as the patient is responsible for collecting and reporting the information within a sleep diary, it is subjective and therefore may not be accurate. Further, as sleep diaries are also interpreted by a doctor or professional, this leaves more room for error and inaccuracy.

Video monitoring 4.1.1.3.5

Video monitoring involves the use of camera and audio technologies to record an individual as they sleep. This provides data specific to the individual to track their sleeping and waking periods, their movements and activities when sleeping, and the sounds they make while sleeping.

Video monitoring is particularly useful for individuals with sleep disorders, as their behaviours during sleep can be observed. Video monitoring can also be used in conjunction with physiological measures to give validity to a phenomenon. For example, a spike in an EMG recording could correspond to bodily movement in the bed, which would be validated with video monitoring.

The interpretation of video monitoring is subjective. For example, it may be unclear whether an individual seen to be getting out of bed during the night is awake or sleep-walking.

Sleep diaries a record containing self-reported descriptions from an individual about their sleeping periods, including an estimated time spent sleeping and judgements they might have about the quality and nature of their sleep

Video monitoring the use of camera and audio technologies to record an individual as they sleep

Theory summary

In this lesson, you have learnt about some of the different ways to measure sleep. These are reflected in figure 5.

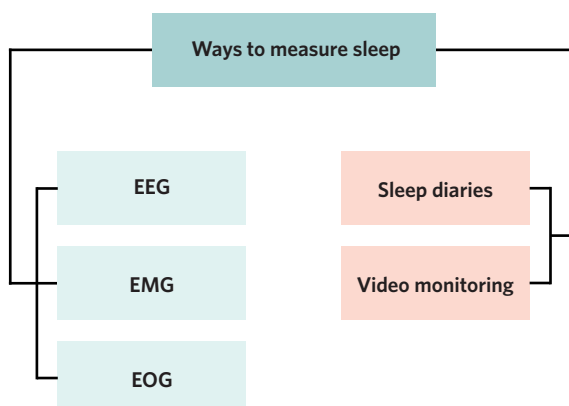


Figure 5 Ways to measure sleep

6B Measuring sleep

Theory review

Question 1

Sleep is always easily and directly measured.

- A. True.
- B. False.

Question 2

Which of the following can be used to measure sleep? **(Select all that apply)**

- I. EEG.
- II. EMG.
- III. Sleep diaries.

Question 3

An EEG measures the electrical activity of the eyes.

- A. True.
- B. False.

Question 4

Sleep diaries may involve an individual doing which of the following? **(Select all that apply)**

- I. Recording how many hours they have slept.
- II. Measuring the electrical activity of their brain.
- III. Writing about how they feel when waking up.
- IV. Setting up a camera and videoing themselves while they sleep.

Question 5

Video monitoring is a completely accurate method of measuring sleep.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 6

Which of the following is most correct?

- A. An electro-oculograph (EOG) is a device that detects, amplifies, and records the electrical activity of the **muscles that move the eyes**.
- B. An electro-oculograph (EOG) is a device that detects, amplifies, and records the electrical activity of **the eyes**.

Question 7

Which of the following is most correct?

- A. An electromyograph (EMG) is a device that detects, **analyses**, and records the electrical activity of the body's muscles.
- B. An electromyograph (EMG) is a device that detects, **amplifies**, and records the electrical activity of the body's muscles.

Question 8

Which of the following is most correct?

- A. Sleep diaries are a record containing self-reported **diagrams** from an individual about their sleeping periods.
- B. Sleep diaries are a record containing self-reported **descriptions** from an individual about their sleeping periods.

Data analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 9–11.

An EEG study of sleep

43 participants, 27 male and 16 female, slept in a sleep laboratory for four nights. The participants ranged in age from 16 to 31 years. All participants were connected to an EEG which monitored the electrical activity in their brains and translated this into brain wave images (Agnew, et al., 1966).

The following table presents the proportion (%) of the sleep episode spent in various stages of sleep.

| Stage of sleep | Night 1 | Night 2 | Night 3 | Night 4 |
|------------------------|---------|---------|---------|---------|
| Stage 0 (awake in bed) | 3.95 | 0.84 | 0.75 | 0.63 |
| REM | 18.85 | 22.77 | 22.99 | 23.14 |
| Stage 1 NREM | 7.07 | 4.75 | 5.86 | 5.45 |
| Stage 2 NREM | 45.71 | 45.94 | 46.77 | 47.60 |
| Stage 3 NREM | 24.4 | 25.69 | 23.64 | 23.13 |

Question 9

How would the EEG used in the study be able to indicate what stage of sleep a participant is in?

- A. Through detecting, amplifying, and recording the electrical activity of the brain and measuring brain waves. From this, the EEG can be used to infer what stage of sleep a participant may be in.
- B. Through detecting, amplifying, and recording the electrical activity of the eyes. From this, the EEG can be used to infer what stage of sleep a participant may be in.
- C. Through detecting, amplifying, and recording the electrical activity of the muscles and measuring movement. From this, the EEG can be used to infer what stage of sleep a participant may be in.
- D. Through measuring the chemical activity of the brain. From this, the EEG can be used to infer what stage of sleep a participant may be in.

Question 10

The results show that on night 1 the participants on average spent 18.85% of their sleep episode in REM sleep. What would the EEG show for the researchers to assume the participants were in REM sleep?

- A. Low frequency of electrical activity.
- B. High frequency of electrical activity.

Question 11

The results show that on night 2 they spent 25.69% of time in NREM stage 3 sleep. If the researchers connected participants to an EMG, what would the likely EMG reading be?

- A. No levels of electrical activity.
- B. Lower levels of electrical activity than when in REM.
- C. Lower levels of electrical activity than when in NREM 1.

Question 12

Which of the following statements is true about the data?

- A. Participants spent the highest percentage of their sleep episodes in NREM stage 2 sleep.
- B. Participants spent the highest percentage of their sleep episodes in NREM stage 1 sleep.
- C. Participants spent the highest percentage of their sleep episodes in NREM stage 3 sleep.
- D. Participants spent the highest percentage of their sleep episodes in REM sleep.

Exam-style**Remember and understand****Question 13** (1 MARK)

An EOG functions by

- A. detecting, amplifying, and recording the electrical activity of the eyes.
- B. detecting, amplifying, and recording the electrical activity of the brain.
- C. detecting, amplifying, and recording the electrical activity of the muscles.
- D. detecting, amplifying, and recording the electrical activity of the muscles surrounding the eyes.

Question 14 (1 MARK)

Which of the following is most likely to be seen on a reading of an EMG during sleep?

- A. An EMG will show higher activity in REM sleep than in NREM sleep.
- B. An EMG will show lower activity in REM sleep than in NREM sleep.
- C. An EMG will not show any activity in NREM sleep, and high activity in REM sleep.
- D. An EMG will show low activity in both REM and NREM sleep.

Question 15 (2 MARKS)

Identify one way to measure sleep and describe how it is used.

Question 16 (2 MARKS)

With reference to both REM and NREM sleep, discuss the frequencies and amplitudes that would be recorded on an EEG during sleep.

Apply and analyse**Question 17** (1 MARK)

Molly has just fallen asleep during class. Which of the following accurately describes an EEG reading of Molly's brain?

- A. An EEG would show high frequency and low amplitude, as she is likely to be in NREM sleep stage 1.
- B. An EEG would show high frequency and high amplitude, as she is likely to be in REM sleep.
- C. An EEG would show some medium frequency and medium amplitude, as she is likely to be in NREM sleep stage 1.
- D. An EEG would show low frequency and low amplitude, as she is likely to be in NREM sleep stage 1.

Question 18 (6 MARKS)

Divya has been having trouble sleeping. She visited her GP who suggested that Divya complete a sleep diary for two weeks.

- a. Identify a type of data that can be collected in a sleep diary and suggest one reason why a sleep diary may be useful for Divya. (2 MARKS)
- b. Describe two points of information Divya would be likely to include in her sleep diary. (2 MARKS)
- c. Describe another measure of sleep that Divya could use in conjunction with a sleep diary. (2 MARKS)

Question 19 (6 MARKS)

Noam is a healthy individual with normal sleeping patterns and is taking part in a research study on sleep. He visited a sleep laboratory, where a specialist took tests whilst Noam was asleep to measure his consciousness. These included the use of an EOG and video monitoring.

- a. What is an EOG? (1 MARK)
- b. With reference to the different types of sleep, suggest Noam's likely EOG readings. Justify your response. (4 MARKS)
- c. Given that Noam has normal sleeping patterns, briefly outline what video monitoring may show in his sleep episode. (1 MARK)

Questions from multiple lessons**Question 20** (3 MARKS)

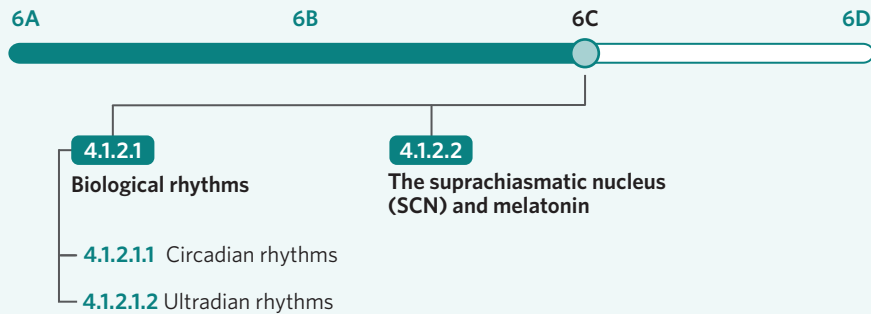
There are many ways to measure sleep.

- a. EEG's measure brain activity. Identify the division of the nervous system that the brain is part of. (1 MARK)
- b. Video recordings of sleep sometimes record people moving in their sleep.
 - i. Identify the division of the nervous system responsible for this movement. (1 MARK)
 - ii. Identify the type of sleep a person is experiencing when they are moving. (1 MARK)

6C Regulation of sleep-wake patterns

STUDY DESIGN DOT POINT

- regulation of sleep-wake patterns by internal biological mechanisms, with reference to circadian rhythm, ultradian rhythms of REM and NREM Stages 1-3, the suprachiasmatic nucleus and melatonin



For most of us, going to sleep at night and waking up in the morning is a simple part of our daily routine. However, behind the scenes, our brains are working hard to perform important processes that ensure we maintain this basic pattern of waking up in the morning and going to sleep at night. In this lesson, you will learn about how the sleep-wake pattern is regulated by a range of biological mechanisms, including circadian rhythms, ultradian rhythms, the suprachiasmatic nucleus, and melatonin.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Biological rhythms 4.1.2.1

In this section of the lesson, you will learn about biological rhythms related to sleep-wake patterns, specifically circadian and ultradian rhythms.

Theory details

Biological rhythms are repeated biological processes that are regulated by internal mechanisms. There are two different types of biological rhythms that are related to our sleep-wake patterns: circadian and ultradian rhythms. Figure 1 shows the biological rhythms that you will learn about in this lesson.

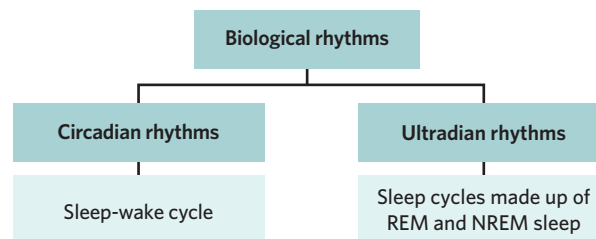


Figure 1 A visual break-down of the biological rhythms explored in this lesson

KEY TERMS

Biological rhythms
repeated biological processes that are regulated by internal mechanisms

Circadian rhythms
biological and behavioural changes that occur as part of a cycle that lasts around 24 hours

Sleep-wake cycle
a 24-hour-cycle that is made up of time spent sleeping and time spent awake and alert

Circadian rhythms 4.1.2.1.1

Circadian rhythms are biological and behavioural changes that occur as part of a cycle that lasts around 24 hours. The sleep-wake cycle is a type of circadian rhythm. The **sleep-wake cycle** is a 24-hour-cycle that is made up of time spent sleeping and time being awake and alert. Therefore, the sleep-wake cycle is a circadian rhythm because it involves biological changes that occur over a 24-hour period as individuals are transitioning from sleep to wakefulness. There are biological mechanisms that help to regulate the sleep-wake cycle, including the suprachiasmatic nucleus and melatonin, both of which you will learn about later in this lesson.

Ultradian rhythms 4.1.2.1.2

Another type of biological rhythm is ultradian rhythms. **Ultradian rhythms** are biological and behavioural changes that occur in a cycle that lasts less than 24 hours.

During sleep, an individual experiences different types and stages of sleep. These two different types of sleep are known as REM and NREM sleep.

- **REM (rapid eye movement) sleep** is a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity.
- **NREM (non-rapid eye movement) sleep** is a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages.
 - As you previously learnt in this chapter, NREM sleep can be broken down into three stages of sleep, known as NREM stages 1–3.

A **sleep episode** is the full duration of time spent asleep, from falling asleep until waking up. Throughout an individual's sleep episode, an individual experiences sleep cycles. A **sleep cycle** is a repeated approximate 90-minute-period in which an individual progresses through stages of REM and NREM (stages 1–3) sleep. The number of sleep cycles an individual experiences in a sleep episode depends on an individual's sleep duration. However, on average, there are usually around five or six sleep cycles during a typical sleep episode.

A sleep cycle is therefore an example of an ultradian rhythm. This is because sleep cycles involve changes in physiological activity that repeat in a cyclic manner in less than 24 hours.

In the following hypnogram, each of the sleep cycles would be considered an ultradian rhythm. Therefore, in this hypnogram there are five ultradian rhythms, as there are five 90-minute sleep cycles consisting of REM and NREM sleep.

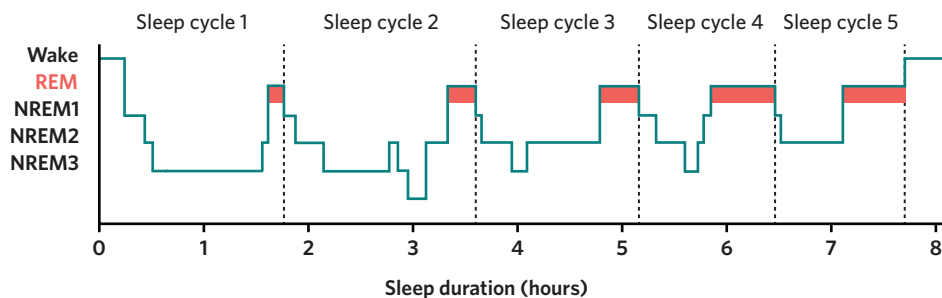


Figure 2 A typical hypnogram for an average adult's sleep episode

The suprachiasmatic nucleus (SCN) and melatonin 4.1.2.2

In this section of the lesson, you will learn about the role of the suprachiasmatic nucleus (SCN) and melatonin in regulating the sleep-wake cycle.

Theory details

What is the SCN?

The **suprachiasmatic nucleus (SCN)** is an area of the hypothalamus that is responsible for regulating an individual's sleep-wake patterns. The SCN is made up of two nuclei that have approximately 10,000 neurons each (Ma & Morrison, 2021) and are located above the optic chiasm (the intersection of the optic nerve fibres between each eye) (Patton & Hastings, 2018). The SCN plays a key role in regulating our sleep-wake cycle by acting like an internal body clock.

Ultradian rhythms

biological and behavioural changes that occur in a cycle that lasts less than 24 hours

REM (rapid eye

movement) sleep a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity

NREM (non-rapid eye

movement) sleep a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages

Sleep episode the full duration of time spent asleep, from falling asleep until waking up

Sleep-cycle a repeated approximate 90-minute-period in which an individual progresses through stages of REM and NREM (stages 1–3) sleep.

The suprachiasmatic

nucleus (SCN) an area of the hypothalamus that is responsible for regulating an individual's sleep-wake patterns

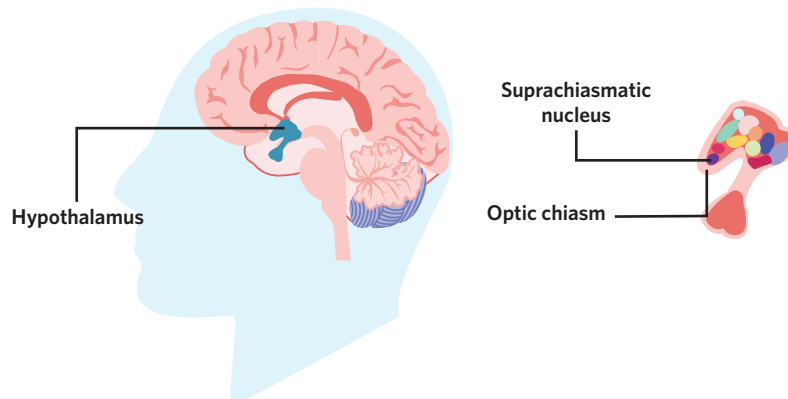


Figure 3 The location of the suprachiasmatic nucleus (SCN) in the brain

How does the SCN regulate the sleep-wake cycle?

The SCN receives information from both external and internal cues to help modulate the circadian rhythm.

- External cues involve information from the environment, such as the presence or absence of light.
- Internal cues involve information that originates within the body (such as the expression and suppression of particular genes, known as clock genes).

WANT TO KNOW MORE?

When clock genes are expressed they produce clock proteins, whereas when they are suppressed, they do not produce clock proteins. Clock genes are expressed or suppressed at certain times during the 24-hour period, which generates and regulates the circadian rhythm.

Clock genes operate via a negative feedback loop. This means that when there are low levels of clock proteins in the body, clock genes are translated into clock proteins. As levels of clock proteins increase in the body, the clock genes stop producing clock proteins and existing clock proteins are degraded. This then allows for clock genes to make more clock proteins that are degraded once again, therefore establishing the negative feedback loop.

This process follows a 24-hour cycle of clock protein generation and degradation, which reflects our circadian rhythm of the sleep-wake cycle.

(Foster & Kreitzman, 2013)

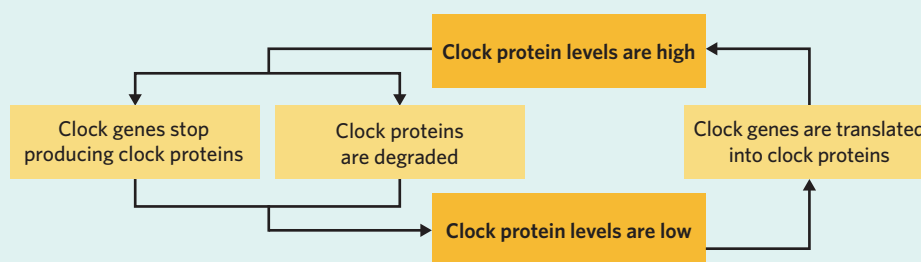


Figure 4 Clock genes operate via a negative feedback loop

Pineal gland a gland in the brain responsible for the production and release of melatonin

Melatonin a hormone released by the pineal gland typically at night-time to induce sleep as part of the sleep-wake cycle

The information from our internal cues and external cues dictate the messages that the SCN sends to the **pineal gland**, which is a gland in the brain responsible for the production and release of melatonin. **Melatonin** is a hormone released by the pineal gland typically at night-time to induce sleep as part of the sleep-wake cycle. The body produces melatonin naturally and usually in adequate amounts. At the onset of darkness in the evening, levels of melatonin start to rise (Grivas & Savvidou, 2007). At around 8 to 9pm, melatonin levels should reach a level that starts to induce a sense of calmness, which promotes sleepiness, leading to an individual naturally wanting to induce sleep at around 10 to 11pm. Melatonin peaks between 2 and 4am, when individuals are typically in the deepest sleep, before gradually declining over the night and before waking in the morning.

Melatonin does not directly induce sleep, but rather promotes a state of calm and relaxation to help make it easier to fall asleep. Once melatonin is produced and released, it travels to all areas of the body via the bloodstream. The level of melatonin in the body helps to regulate the sleep-wake cycle. Melatonin levels are at their highest at night-time and lowest in the morning, therefore promoting sleep at night-time.

Figure 5 provides a visual depiction of the SCN's role in melatonin release.

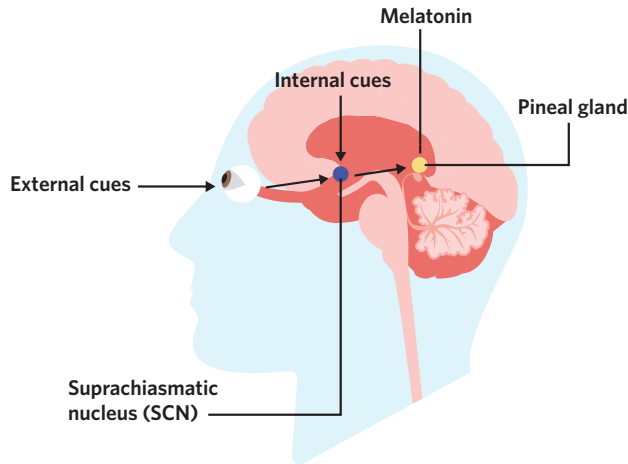


Figure 5 The SCN sends signals to the pineal gland to release melatonin

The following steps summarise the process of the SCN regulating the sleep-wake cycle at night-time:

1. The SCN receives external cues. The SCN also receives internal cues.
2. After receiving both internal and external cues, the SCN sends neural messages (signals) to the pineal gland to produce and release melatonin.
3. The pineal gland releases melatonin into the bloodstream, which promotes feelings of calm and relaxation, therefore promoting sleep.

This process is visualised in figure 6.

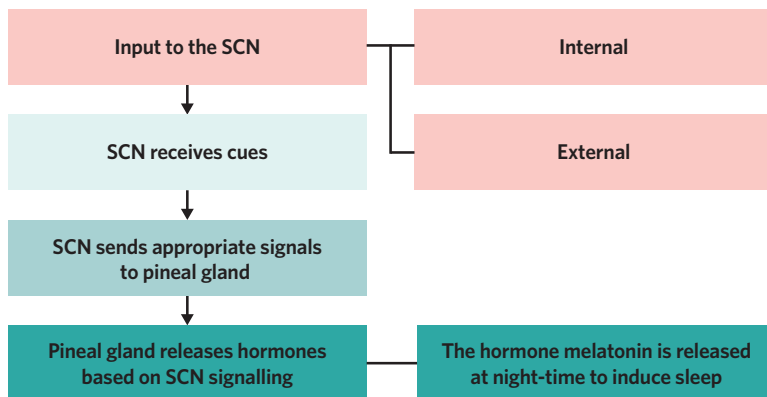


Figure 6 The role of the SCN in the sleep-wake cycle

Similarly to melatonin, cortisol also plays an important role in the sleep-wake cycle. **Cortisol** is a hormone that is responsible for increasing alertness and maintaining heightened arousal. Therefore, it is another hormone that regulates the sleep-wake cycle as it is released by the adrenal glands in the morning to promote wakefulness and alertness. The SCN is not responsible for releasing cortisol, but rather, the adrenal cortex is.

Figure 7 summarises the hormones that regulate the sleep-wake cycle.

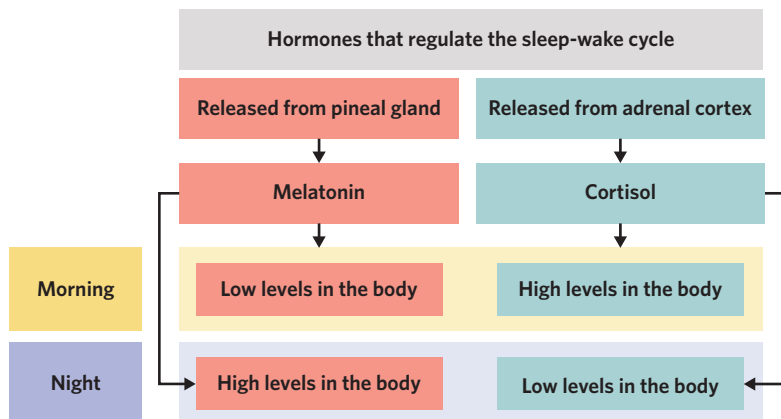


Figure 7 Hormones that regulate the sleep-wake cycle

USEFUL TIP

It is important to understand that the SCN does not actually release melatonin. The SCN is only responsible for sending neural messages to the pineal gland, which enables the pineal gland to release melatonin. Therefore, when answering questions about the role of the SCN in the sleep-wake cycle, you should make sure you do not write that SCN releases melatonin, but rather that the SCN signals to the pineal gland to release melatonin.

Cortisol a hormone that is responsible for increasing alertness and maintaining heightened arousal

Theory summary

In this lesson, you learnt all about sleep-wake patterns and the biological mechanisms through which they are regulated.

Key concepts you learnt about include:

- biological rhythms, specifically circadian rhythms and ultradian rhythms
- sleep-wake cycle (an example of a circadian rhythm) and sleep cycles (an example of an ultradian rhythm)
- the suprachiasmatic nucleus (SCN)
- hormones involved in the sleep-wake cycle, specifically melatonin and cortisol.

6C Questions

Theory review

Question 1

The sleep-wake cycle is regulated by biological mechanisms.

- A. True.
- B. False.

Question 2

The sleep-wake cycle involves which of the following? **(Select all that apply)**

- I. Circadian rhythms.
- II. Melatonin.
- III. Sleep cycles.

Question 3

Ultradian rhythms differ from circadian rhythms as they are repeated cycles that occur in a period of time that lasts less than 24 hours, whereas circadian rhythms last for 24 hours.

- A. True.
- B. False.

Question 4

Melatonin is released at night-time to promote wakefulness.

- A. True.
- B. False.

Question 5

The suprachiasmatic nucleus (SCN) is involved in the timing of melatonin release.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. Circadian rhythms are biological and behavioural **changes** that occur as part of **a cycle** that lasts around 24 hours.
- B. Circadian rhythms are biological and behavioural **repetitions** that occur as part of a **process** that lasts around 24 hours.

Question 7

Which of the following sentences is most correct?

- A. Ultradian rhythms are **biological and behavioural changes** that occur in **a cycle that lasts less than** 24 hours.
- B. Ultradian rhythms are **body and brain changes** that occur in less than 24 hours.

Question 8

Which of the following sentences is most correct?

- A. Melatonin is a **substance made** by the pineal gland at night-time to induce sleep as part of the sleep-wake cycle.
- B. Melatonin is a **hormone released** by the pineal gland at night-time to induce sleep as part of the sleep-wake cycle.

Text analysis

The following assessment skills type reflects the study design assessment dot point:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 9-12.

Media text 1

Kari Leibowitz lived in Tromsø, Norway for a year where he experienced no sunlight from November to January, a time period referred to as 'The Polar Night'. Leibowitz stated that many people responded to his decision to move with concern. A quote from Leibowitz regarding this: "I could never live there," was the most common response I heard. "That winter would make me so depressed", many added, or "I just get so tired when it's dark out".

Leibowitz explored Tromsø and got to know the city and the locals well. He discovered that many people had different methods or ways about approaching The Polar Night; some took cod-liver oil, some used lamps that simulated patterns of the sun, whilst some relied on the community and regular socialising.

(Leibowitz, 2015)

Media text 2

In Svalbard, Norway, the sun does not set from April to August, which is referred to as the 'Midnight Sun'. Svalbard is a place that attracts a lot of attention and tourists due to the Midnight Sun. People that live in Svalbard during the Midnight Sun, tend to agree that time becomes less important and you can partake in 'day-time' activities at nighttime, such as gardening at 12am. People also use thick light-blocking curtains to help sleep. There are many popular things to do during the Midnight Sun, such as going to festivals or taking long mountain hikes.

(Northern Norway, n.d.)

Question 9

The presence and absence of light discussed in both articles (Media text 1 and Media text 2) best reflects the concept of

- A. the pineal gland releasing melatonin.
- B. external cues influencing the suprachiasmatic nucleus.
- C. internal cues influencing the suprachiasmatic nucleus.
- D. external cues influencing the pineal gland.

Question 10

Which of the following best describes the impact on the sleep-wake cycle for those living in the area described in the first article (Media text 1)?

- A. The sleep-wake cycle may change as external cues to the SCN will be impacted which may lead to inappropriate melatonin levels being released by the pineal gland.
- B. The sleep-wake cycle may change as internal cues to the SCN will be impacted which may lead to inappropriate melatonin levels being released by the pineal gland.
- C. The sleep-wake cycle will not change as both internal and external cues will not be impacted.
- D. The sleep-wake cycle may change as external cues to the SCN will not be impacted which will not change melatonin levels being released by the pineal gland.

Question 11

The second article (Media text 2) says that locals still sleep well despite the presence of light 24/7. Which of the following options best explains this?

- A. The presence of light acts as an external cue and promotes the release of melatonin from the pineal gland, therefore making it easier to fall asleep.
- B. The SCN will release melatonin due to internal cues.
- C. The SCN often does not rely on external cues, such as light, to maintain a sleep-wake cycle, but rather, relies on internal cues.
- D. The SCN relies on both external and internal cues which means that even in the presence of light, internal cues can help maintain some level of circadian rhythm.

Question 12

Based on your knowledge of external cues, which of the two populations would you expect to have higher levels of melatonin?

- A. The population described in media text 1, where the sun does not rise.
- B. The population described in media text 2, where the sun does not set.
- C. Both populations would have the same melatonin levels.
- D. External cues would not influence the population's levels of melatonin.

Exam-style**Remember and understand****Question 13** (1 MARK)

Which of the following best describes the sleep-wake cycle?

- A. The sleep-wake cycle is a 24-hour-cycle that is made up of time spent sleeping and time being awake and alert.
- B. The sleep-wake cycle is a circadian rhythm that is made up of time spent sleeping and time being awake and alert that lasts less than 24 hours.
- C. The sleep-wake cycle is made of time asleep and time awake.
- D. The sleep-wake cycle is an ultradian rhythm.

Question 14 (1 MARK)

Levels of melatonin are

- A. higher at night-time and lower in the morning.
- B. high at night-time and high in the morning.
- C. low at night-time and low in the morning.
- D. lower at night-time and higher in the morning.

Question 15 (1 MARK)

Name the area of the brain that releases melatonin.

Question 16 (3 MARKS)

Explain how the suprachiasmatic nucleus (SCN) works in regulating the sleep-wake cycle.

Question 17 (3 MARKS)

Using examples, describe the difference between circadian and ultradian rhythms.

Apply and analyse**Question 18** (1 MARK)

Damian's brain is struggling to produce adequate levels of melatonin. Which of the following best describes how this may impact Damian's sleep-wake cycle?

- A. Damian's suprachiasmatic nucleus will not be able to release melatonin at night-time and therefore he may struggle to fall asleep.
- B. Damian's sleep-wake cycle will function as normal.
- C. Inadequate levels of melatonin will be released from Damian's pineal gland which may cause him to have difficulty falling asleep.
- D. Damian's pineal gland will start to over-produce melatonin and he will fall asleep easily.

Question 19 (1 MARK)

Freya often naps during the day, however, her brother Harvey only sleeps at night-time and finds it strange Freya can sleep at any time. He finds it easiest to sleep when it's dark, but even if it's still light at night he can fall asleep easily.

Which of the following is the best possible explanation for why Harvey can still sleep even if it's light at night-time?

- A. Harvey's external cues allow him to feel sleepy at night-time even when it is light.
- B. The presence of light makes it easy for Harvey to fall asleep at night-time.
- C. Harvey's internal cues allow him to still feel sleepy at night-time even when it is light.
- D. Harvey's internal cues override his external cues.

Question 20 (4 MARKS)

Gia is a high-school student and is very busy with school work and extracurricular activities. She is often in bed by 11pm every night as it is important for her to get enough sleep and maintain a regular sleeping pattern so she can keep up with her busy lifestyle.

Using psychological terminology, explain the process Gia's brain goes through from being awake to being ready for sleep.

Questions from multiple lessons**Question 21** (1 MARK)

Which of the following statements best reflects the concept of sleep cycles?

- A. Sleep cycles are circadian rhythms that involve REM sleep, which is characterised by low levels of brain activity.
- B. Sleep cycles are ultradian rhythms that involve REM sleep and three stages of NREM sleep.
- C. Sleep cycles are ultradian rhythms that only involve REM sleep, which is characterised by high levels of brain activity.
- D. Sleep cycles are circadian rhythms that involve REM sleep and three stages of NREM sleep.

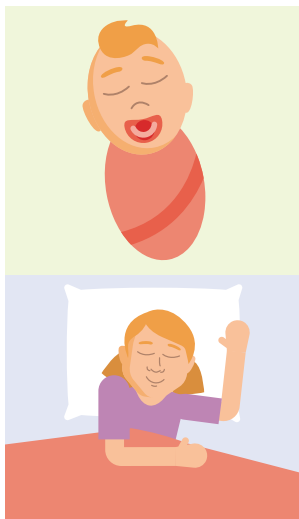
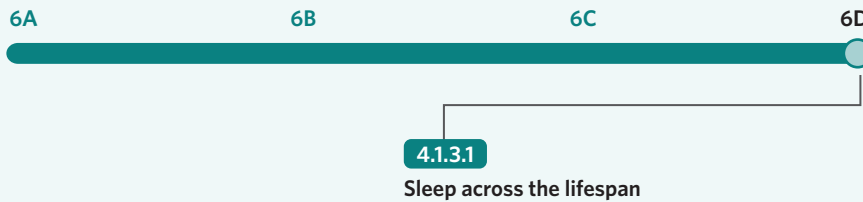
Question 22 (2 MARKS)

Compare the role of cortisol in the sleep-wake cycle and the stress response.

6D Sleep across the lifespan

STUDY DESIGN DOT POINT

- differences in, and explanations for, the demands for sleep across the life span, with reference to total amount of sleep and changes in a typical pattern of sleep (proportion of REM and NREM)



Throughout your life, your sleep patterns change in many ways. When you were much younger, it is likely that you slept significantly more than you do now as a teenager. You might also find that your sleep patterns differ from your parents' sleep patterns. In this lesson, you will learn about the differences in sleep across the lifespan.

Sleep across the lifespan 4.1.3.1

This lesson will explore the way sleep changes across the lifespan.

Theory details

There are many different characteristics of sleep that can change over the lifespan. These include:

- sleep onset
- sleep duration
- awakenings during sleep
- proportion of REM sleep
- proportion of NREM sleep.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

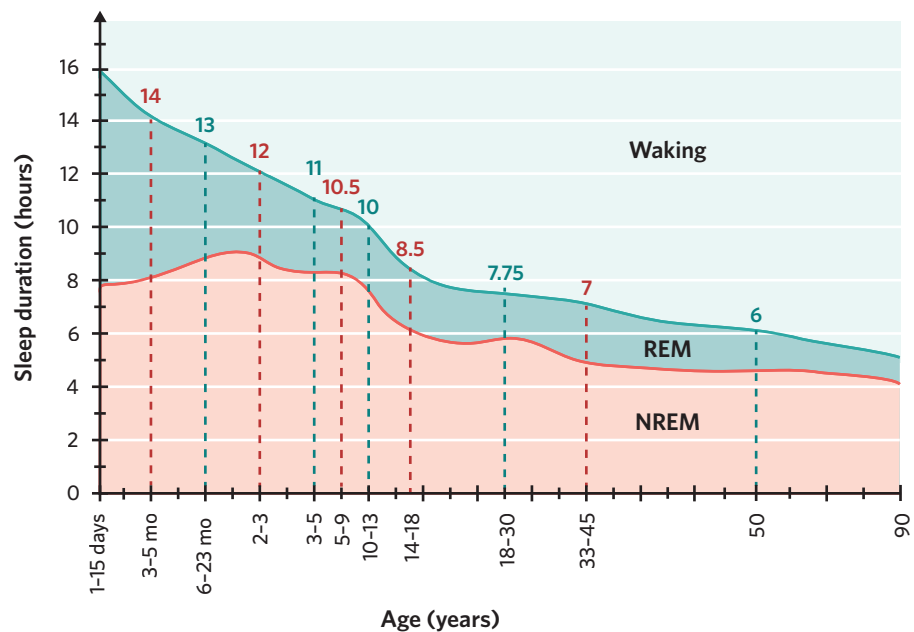


Figure 1 Proportion of REM and NREM sleep and sleep duration across the lifespan

As can be seen in in figure 1, sleep duration and the proportion of REM sleep generally decreases as age increases. However, these trends occur at different rates as the proportion of REM sleep stops significantly decreasing from childhood onwards. This can be illustrated through the use of hypnograms during different periods of the lifespan.

In order to gain a deeper understanding of these trends, it is important to understand the changes in the characteristics of sleep across specific age groups. These are shown in table 1.

Table 1 Sleep across the lifespan

| Age group | Characteristics of sleep |
|---------------------------------------|--|
| Neonatal period (1–15 days) | <ul style="list-style-type: none"> During this period, sleep duration is the highest it will ever be in the lifespan. New-born babies sleep for approximately 16 hours. Approximately 50% of the sleep episode is REM sleep and approximately 50% is NREM sleep. |
| Infancy (3–24 months) | <ul style="list-style-type: none"> Sleep duration decreases to approximately 13.5 hours. The proportion of REM and NREM sleep also changes to approximately 35% REM sleep and approximately 65% NREM sleep. |
| Childhood (2–14 years) | <ul style="list-style-type: none"> Sleep duration decreases again to approximately 11 hours. The proportion of NREM sleep increases slightly to around 80% of the sleep episode, while REM sleep decreases to approximately 20% of the sleep episode. As the childhood period is a significant amount of time, there are slight variations across this period. For example, sleep duration starts at around 12 hours when children are about two years old, and decreases to around 10 hours when children are about 14 years old. REM sleep also starts at around 25% of the sleep episode and decreases to around 18.5% of the sleep episode. |
| Adolescence (14–18 years) | <ul style="list-style-type: none"> Sleep duration decreases again to approximately 9 hours. The proportion of REM and NREM sleep remains fairly constant at 20% REM and 80% NREM sleep. Adolescents also experience a biological delayed sleep onset by 1–2 hours, meaning they are more likely to become sleepier later and wake up later. |
| Young adulthood (18–30 years) | <ul style="list-style-type: none"> Sleep duration decreases again to approximately 7.75 hours. The proportion of REM and NREM sleep remains fairly constant at 20% REM and 80% NREM sleep. |
| Middle adulthood (30–75 years) | <ul style="list-style-type: none"> Sleep duration remains at approximately 7–8 hours. The proportion of REM and NREM sleep remains fairly constant at 20% REM and 80% NREM sleep. |
| Old age (75+ years) | <ul style="list-style-type: none"> Sleep duration continues to decrease to approximately 6 hours. The proportion of REM and NREM sleep remains fairly constant at 20% REM and 80% NREM sleep. Older adults tend to experience advanced sleep phase syndrome, which is a biological shift forward in their sleep-wake cycle, meaning they become sleepier earlier and wake up earlier. |

An individual's sleep requirements change because their physical and cognitive needs change over time. REM sleep has been suggested to be important for the brain and cognitive development and rest, whilst NREM sleep has been suggested to be important for physiological rest and development. The explanations for the differences in sleep across the lifespan are discussed in table 2.

Table 2 Explanations for the notable differences in sleep across the lifespan

| Lifespan stage | Explanation |
|------------------------------------|--|
| Neonatal period and infancy | Time spent in REM sleep is significantly high because newborns and infants are experiencing rapid brain development. |
| Childhood | Time spent in REM sleep starts to reduce as the pace of brain development steadies. |

Continues ►

USEFUL TIP

The word 'proportion' is used to describe REM and NREM sleep and how it changes across the lifespan. Proportion, in this circumstance, refers to the amount of either REM or NREM sleep in comparison to the total amount of sleep experienced in a sleep episode. For example, if a sleep episode is made up of 20% REM sleep, you can say that the proportion of REM sleep experienced is 20%.

USEFUL TIP

The listed hours of sleep for each age group varies among different sources as there is not one definitive answer as to how long each age group sleeps. This is due to the variation within these age groups. For this reason, it is more important for you to understand the overall trends of how sleep duration changes between the age groups, rather than the exact amount of hours of sleep duration.

Table 2 Continued

| Lifespan stage | Explanation |
|-----------------------|---|
| Adolescence | In adolescence, sleep patterns can change due to various social factors that play a role in the decreased proportion of sleep during adolescence, such as having to wake up early for school and having social commitments during the nighttime. Adolescents are also more prone to delayed circadian phase disorders in which their biological 'clocks' are not in alignment with the demands of their environments. |
| Adulthood and old age | In older adults, lower levels of sleep tend to be attributed to ill-health and an increase in the prevalence of sleep disorders, as well as the reduced amount of cognitive and physical growth within this age group. |

The VCE study design dot point specifies that you are to learn about sleep demands across the lifespan. The term 'demands' can be understood as sleep requirements, meaning the amount of sleep an individual requires, at their specific age, in order to healthily function. However, due to other factors (whether internal or external), individuals often do not meet these requirements. This explains why there are some discrepancies (across different sources) in the number of hours individuals sleep at specific stages of the lifespan, as it may either be based on what they require or what they typically average. Table 1 presents the typical sleep averages for each stage of the lifespan, while table 3 compares both typical sleep averages and sleep requirements across the lifespan.

Table 3 A comparison across the lifespan of sleep requirements and sleep averages

| Lifespan stage | Sleep requirement for healthy functioning (hours (according to the Sleep health foundation)) | Typical sleep average (hours) |
|--------------------------------|--|-------------------------------|
| Neonatal period (1–15 days) | 14–17 | 16–18 |
| Infancy (3–24 months) | 12–15 | 13.5 |
| Childhood (2–14 years) | 10–14 | 11 |
| Adolescence (14–18 years) | 8–10 | 9 |
| Young adulthood (18–30 years) | 7–9 | 7.75 |
| Middle adulthood (30–75 years) | 7–9 | 7–8 |
| Old age (75+ years) | 7–8 | 6 |

WANT TO KNOW MORE?

A notable characteristic of sleep during old age is that there are increased brief awakenings during the sleep episode. As the sleep episode progresses, it is common for an elderly person to wake up briefly and then fall back asleep. This is demonstrated in figure 2, where brief awakenings are evident by the horizontal distance of the hypnogram corresponding to the 'awake' sleep stage on the vertical axis. This also occurs for newborn babies as they have very long sleep durations but do not sleep throughout the whole night without waking up at certain stages.

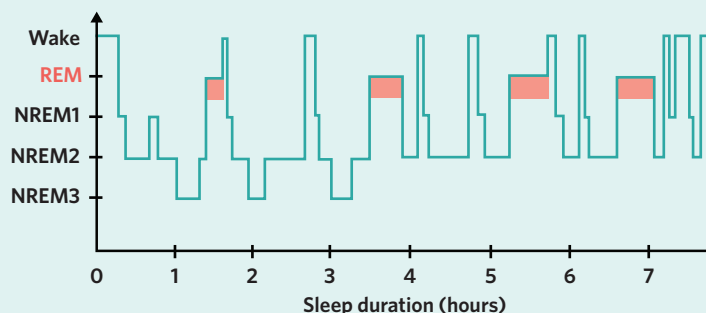


Figure 2 Hypnogram of an elderly person's sleep episode

Theory summary

In this lesson, you have learnt about how sleep changes across the human lifespan. You should now be able to distinguish between the sleep of all significant age groups, including the neonatal period, infancy, childhood, adolescence, adulthood, and old age. Characteristics of sleep that you should now be able to compare across the lifespan include sleep duration and the proportion of REM and NREM sleep.

6D Questions

Theory review

Question 1

Sleep requirements change across the lifespan.

- A. True.
- B. False.

Question 2

There is no explanation for why sleep requirements change across the lifespan.

- A. True.
- B. False.

Question 3

Which of the following characteristics of sleep will change in an expected way across the lifespan?

(Select all that apply)

- I. Duration of sleep.
- II. Proportion of REM and NREM sleep.
- III. The content of dreams experienced in sleep.

Question 4

Which of the following is true of sleep requirements for individuals in the neonatal or infancy age group?

(Select all that apply)

- I. The proportion of REM sleep is high.
- II. NREM sleep does not occur.
- III. 10 hours of sleep is required for healthy functioning.

Question 5

Older adults require the most amount of sleep as they need more rest and recovery due to ill-health.

- A. True.
- B. False.

Assessment skills

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 6

Which of the following best describes a difference between the sleep requirements of newborns and older adults?

- Newborns spend approximately 50% of their sleep episode in NREM sleep, whereas older adults spend approximately 80% of their sleep in NREM sleep.
- Newborns spend approximately 80% of their sleep episode in NREM sleep, whereas older adults spend approximately 50% of their sleep in NREM sleep.

Question 7

A similarity between the sleep requirements of adolescents and adults is that

- both adolescents and adults spend approximately 80% of their sleep episode in REM sleep.
- both adolescents and adults spend approximately 20% of their sleep episode in REM sleep.

Question 8

Which of the following best describes the difference in sleep duration between children and adolescents?

- Children require approximately 11 hours of sleep, whereas adolescents require approximately 8.5 hours of sleep.
- Children require approximately 8.5 hours of sleep, whereas adolescents require approximately 11 hours of sleep.

Exam-style

Remember and understand

Question 9 (1 MARK)

At birth, the proportion of non-rapid eye movement (NREM) sleep is

- lower than the proportion of REM sleep.
- equal to the proportion of REM sleep.
- higher than the proportion of REM sleep.
- 100 per cent of all sleep.

Adapted from VCAA Psychology exam 2013 Q4

Question 10 (1 MARK)

What might a comparison of a typical night's sleep of an adolescent and an elderly person show?

- Elderly people experience significantly higher amounts of REM sleep.
- Adolescents experience significantly higher amounts of NREM sleep.
- Elderly people spend proportionately more time in REM sleep than adolescents.
- Elderly people typically have shorter sleep duration than adolescents.

Question 11 (3 MARKS)

Describe the difference in the proportion of REM sleep in newborns and adolescents. Justify your response.

Question 12 (2 MARKS)

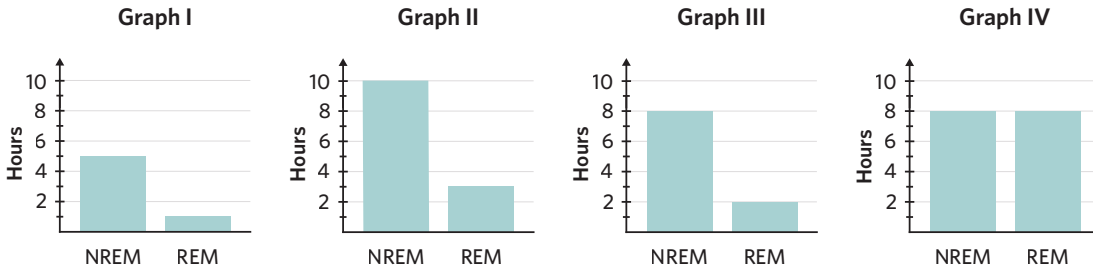
Compare how REM and NREM sleep would differ in a hypnogram of an infant and a hypnogram of a healthy adult.

Adapted from VCAA Psychology exam 2018 Q5b

Apply and analyse

Question 13 (1 MARK)

Joseph is a healthy newborn baby and Gabby is a healthy 65-year old.



Which of the graphs represents the amount of time spent in NREM sleep and REM sleep in a typical 24-hour period for Joseph and Gabby?

| | Joseph | Gabby |
|----|--------|-------|
| A. | III | I |
| B. | II | IV |
| C. | IV | I |
| D. | IV | III |

Adapted from VCAA Psychology exam 2017 Q38

Question 14 (1 MARK)

Osman is a healthy newborn baby who sleeps for an average of 16 hours per night.

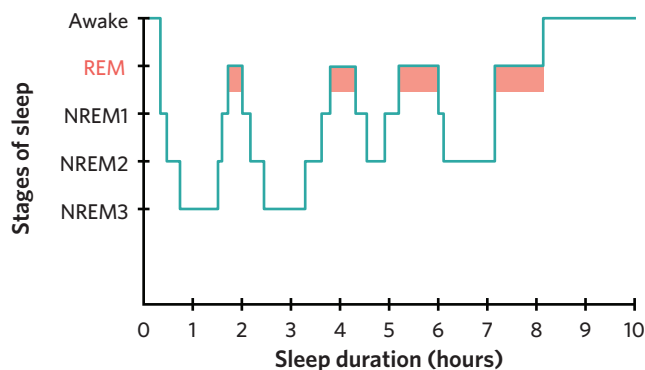
It is likely that his sleep pattern

- A. is normal for a newborn baby.
- B. demonstrates partial sleep deprivation.
- C. is abnormally short for a newborn baby.
- D. is likely to consist of proportionally more stages 3 and 4 sleep than any other stage.

Adapted from VCAA Psychology exam 2013 Q35

Question 15 (4 MARKS)

The figure is a hypnogram representing the sleep cycle of a healthy adolescent.



- a. Outline two differences between rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep evident in the hypnogram. (2 MARKS)

Adapted from VCAA Psychology exam 2018 Q5a

- b. Explain how the hypnogram of a healthy infant would differ to this hypnogram of a healthy adolescent. (2 MARKS)

Questions from multiple lessons

Question 16 (1 MARK)

Which of the following indicates a typical sleep cycle for an adolescent?

| | Duration of sleep cycle (minutes) | Number of complete sleep cycles |
|----|-----------------------------------|---------------------------------|
| A. | 30–40 | 1 or 2 |
| B. | 60–70 | 1 or 2 |
| C. | 10–15 | 4 or 5 |
| D. | 90–120 | 4 or 5 |

Adapted from VCAA Psychology exam 2016 Q10

Question 17 (6 MARKS)

Dr Rozario wants to test how the sleep-wake cycle differs in teenage and adult populations. As she works at a university, she recruits 50 participants by standing outside the Psychology building and asking people walking in if they would like to participate. She divides her sample into two groups; teenagers (aged 18–19 years), and adults (aged 20–40 years). For a period of two weeks, she measured the sleep-wake cycle by recording the average time each participant went to sleep at night and woke up in the morning, as well as the total number of hours slept. Dr Rozario hypothesised that teenagers would experience 8–9 hours of sleep and adults would experience 6–8 hours of sleep, based on sleep requirements for each age group.

- What sampling method did Dr. Rozario use in her study? (1 MARK)
- After calculating the average number of hours of sleep that each group got in one week, Dr. Rozario was disappointed to see that her data did not reflect what she had predicted, particularly for the teenage group.
 - Suggest the results Dr Rozario may have obtained from the teenage group. (1 MARK)
 - Describe why these results may have occurred. (2 MARKS)
- Dr. Rozario decided to extend her research so that she could compare the sleep-wake cycles of adults, teenagers and children (aged 12–17 years). When reviewed by an ethics board, she was told that prior to extending her research she must first update her informed consent procedures. Why would Dr. Rozario need to update her informed consent procedures when working with people under the age of 18? (2 MARKS)

Chapter 6 review

Chapter summary

This chapter was all about sleep. You learnt that sleep is a psychological construct and can be described as a naturally occurring altered state of consciousness. You also learnt that sleep involves different characteristics and processes.

In lesson **6A Sleep as a psychological construct**, you were introduced to sleep. Specifically, you learnt about:

- what sleep is
- how consciousness relates to sleep and the different states of consciousness
- the different types of sleep and their characteristics.

In lesson **6B Measuring sleep**, you learnt about how sleep is measured. Specifically, you learnt about:

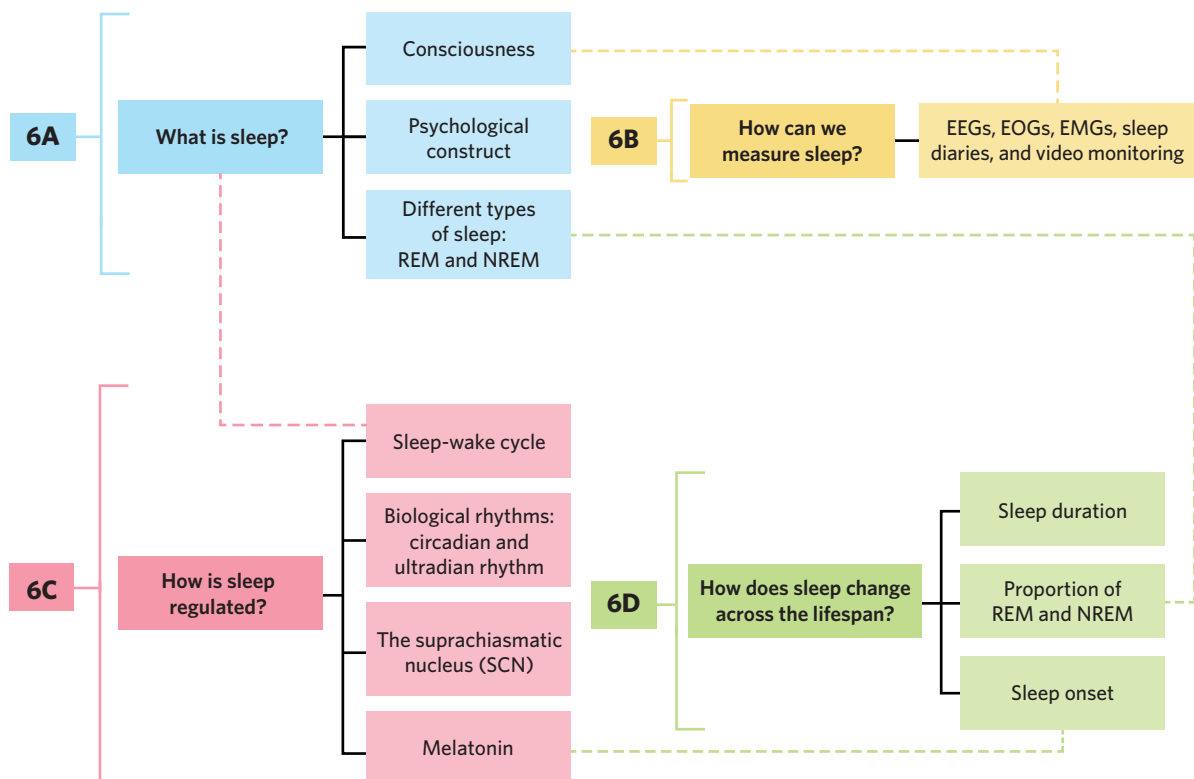
- EEGs
- EMGs
- EOGs
- sleep diaries
- video monitoring.

In lesson **6C Regulation of sleep-wake patterns**, you learnt about the sleep-wake cycle. Specifically, you learnt about:

- biological rhythms, including circadian rhythms and ultradian rhythms
- the suprachiasmatic nucleus (SCN)
- melatonin.

In lesson **6D Sleep across the lifespan**, you learnt about the differences in sleep patterns in different age groups. Specifically, you learnt that different age groups experience differences in:

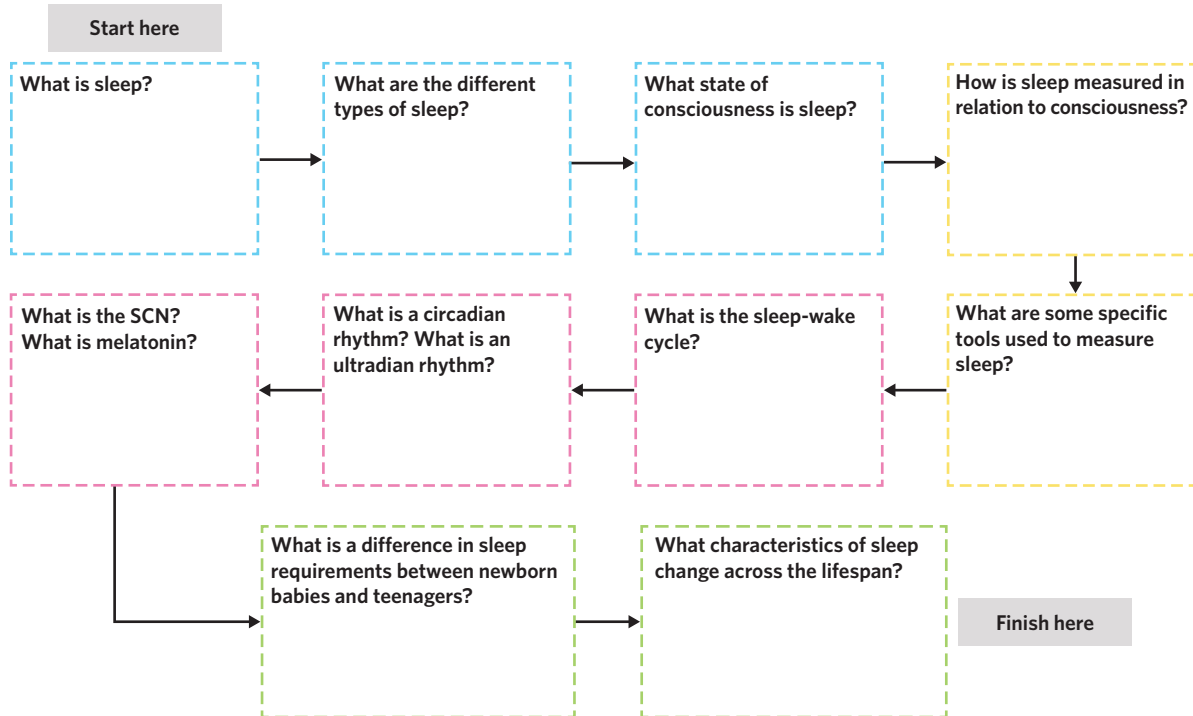
- sleep duration
- sleep onset and wake times
- the proportion of REM and NREM sleep in a sleep episode.



Chapter review activities

Review activity 1: Flow chart

Copy out the following flowchart onto a piece of paper and fill in the blanks.



Review activity 2: Fill in the table

Copy out the following table and fill in the descriptions for the key terms.

| Key terminology | Description |
|-------------------------------|-------------|
| Sleep | |
| Sleep episode | |
| REM sleep | |
| NREM sleep | |
| EEG | |
| EMG | |
| EOG | |
| Sleep diaries | |
| Video monitoring | |
| Sleep-wake cycle | |
| Biological rhythm | |
| Circadian rhythm | |
| Ultradian rhythm | |
| Sleep cycle | |
| SCN (suprachiasmatic nucleus) | |
| Melatonin | |
| Cortisol | |

Chapter 6 test

Multiple choice

Question 1 (1 MARK)

A circadian rhythm is

- A. a psychological cycle lasting between one and 24 hours.
 - B. a physiological cycle lasting around 24 hours.
 - C. a psychological cycle lasting around 24 hours.
 - D. a physiological cycle lasting between one and 24 hours.
-

Question 2 (1 MARK)

REM sleep can be associated with

- A. high levels of movement of the muscles surrounding the eyes.
 - B. minimal activity in the brain.
 - C. deep sleep.
 - D. muscle movement.
-

Question 3 (1 MARK)

A comparison between the sleep of a typical adolescent and an elderly person would show that

- A. sleep duration and the proportion of REM sleep are significantly higher for an adolescent.
 - B. sleep duration and the proportion of NREM sleep are significantly higher for an adolescent.
 - C. sleep duration is higher for an adolescent and both have a similar proportion of REM and NREM sleep.
 - D. both age groups have similar sleep duration and proportion of REM and NREM sleep.
-

Question 4 (1 MARK)

A comparison between the sleep of a typical newborn baby and an adult would show that

- A. sleep duration and the proportion of REM sleep are significantly higher for an adult.
 - B. sleep duration and the proportion of NREM sleep are significantly higher for a newborn baby.
 - C. sleep duration and the proportion of NREM sleep are significantly higher for an adult.
 - D. sleep duration and the proportion of REM sleep are significantly higher for a newborn baby.
-

Question 5 (1 MARK)

An EEG works by

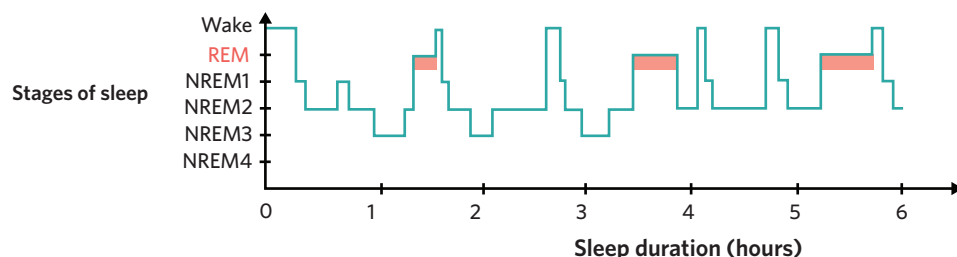
- A. detecting, amplifying, and recording the electrical activity of the eyes.
- B. detecting, amplifying, and recording the electrical activity of the brain.
- C. detecting, amplifying, and recording the electrical activity of the muscles.
- D. detecting, amplifying, and recording brain waves.

Short answer

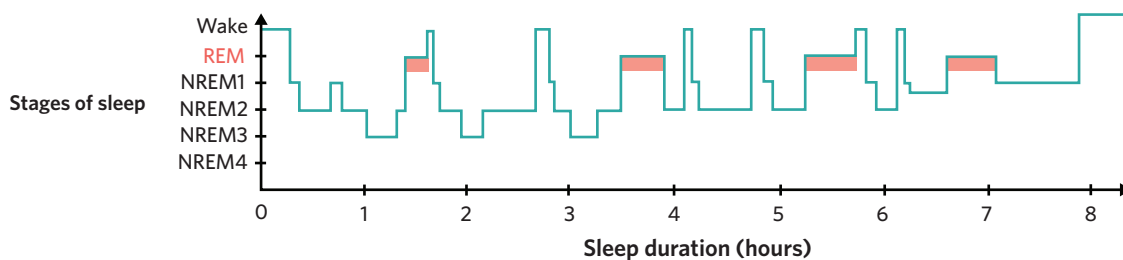
Question 6 (2 MARKS)

Identify which of the hypnograms displays an elderly person's sleep episode. Justify your response.

Hypnogram 1



Hypnogram 2

**Question 7** (2 MARKS)

Define sleep cycles and describe why they are an example of an ultradian rhythm.

Question 8 (2 MARKS)

Compare REM and NREM sleep.

Question 9 (6 MARKS)

Carla is a university student and seems to feel tired no matter how much sleep they get. Despite going to bed and falling asleep easily at a reasonable time of 10pm, Carla still feels tired the next day.

- Describe the sequence of the first sleep cycle Carla is likely to experience. (4 MARKS)
- Suggest one way Carla could measure their sleep and explain how this may provide information on why Carla feels tired. (2 MARKS)

Question 10 (10 MARKS)

Maggie is a healthy teenager who is currently in year 11. Maggie lives an active lifestyle, waking up early every morning for rowing training and going to school during the day. Maggie tries her best to go to bed early each night and keeps her blinds open to help her wake up in the morning. Whenever Maggie complains to her parents about not getting enough sleep, they tell her that she shouldn't complain because they sleep far less than she does and they still feel fine. Maggie thinks that she might sleep-walk some nights, as she has woken up sometimes in different places around her house.

Using your knowledge of sleep and the sleep-wake cycle, provide a detailed description of a typical night of sleep for Maggie. In your response, include a discussion of Maggie's sleep requirements in comparison to her parents and suggest how Maggie may use different measures to investigate her potential sleep-walking.

7



CHAPTER 7

Importance of sleep to mental wellbeing

LESSONS

- 7A Sleep deprivation
- 7B Circadian rhythm sleep disorders
- 7C Improving sleep

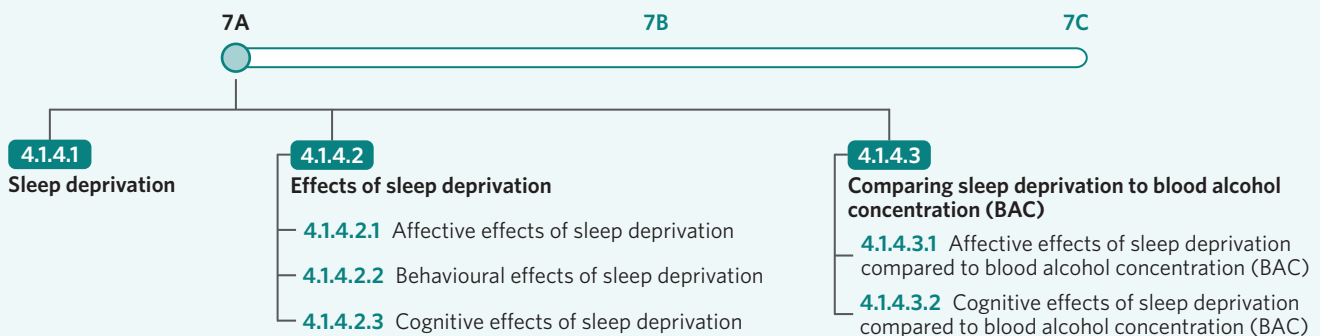
KEY KNOWLEDGE

- the effects of partial sleep deprivation (inadequate sleep either in quantity or quality) on a person's affective, behavioural and cognitive functioning, and the affective and cognitive effects of one night of full sleep deprivation as a comparison to blood alcohol concentration readings of 0.05 and 0.10
- changes to a person's sleep-wake cycle that cause circadian rhythm sleep disorders (Delayed Sleep Phase Syndrome [DSPS], Advanced Sleep Phase Disorder [ASPD] and shift work) and the treatments of circadian rhythm sleep disorders through bright light therapy
- improving sleep hygiene and adaptation to zeitgebers to improve sleep-wake patterns and mental wellbeing, with reference to daylight and blue light, temperature, and eating and drinking patterns

7A Sleep deprivation

STUDY DESIGN DOT POINT

- the effects of partial sleep deprivation (inadequate sleep either in quantity or quality) on a person's affective, behavioural and cognitive functioning, and the affective and cognitive effects of one night of full sleep deprivation as a comparison to blood alcohol concentration readings of 0.05 and 0.10



In the previous chapter, you learnt about the importance of sleep. Given that sleep is so important, it is common to be intrigued by what happens when we don't get enough quality sleep. This chapter focuses on disruptions and changes to sleep-wake patterns. In this lesson, you will explore the effect of sleep deprivation on a person's ability to function and compare this to blood alcohol concentration.

Sleep deprivation 4.1.4.1

Sleep deprivation is more complex than not getting enough hours of sleep. In this section of the lesson, you will learn about sleep deprivation and how it is defined.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Sleep deprivation
inadequate quantity and/or quality of sleep

Full sleep deprivation
when an individual has no sleep within a 24-hour-period

Partial sleep deprivation
when an individual sleeps for some duration within a 24-hour-period, but the sleep duration is too short, or the quality of sleep is poor

Theory details

Sleep deprivation refers to inadequate quantity and/or quality of sleep. Although most people tend to think that sleep deprivation is only about the quantity of sleep, the quality of sleep is also an equally important factor in sleep deprivation. For example, if an individual sleeps for eight hours a night, but only gets light (NREM stages 1 and 2) sleep, they will still show the symptoms of sleep deprivation. In this way, quantity is about how many hours of sleep is experienced and quality is about the types of sleep experienced, as well as the presence of sleep disruptions, such as sleepwalking. It is important to remember that both quality and quantity of sleep affect whether or not a person is sleep deprived.

Sleep deprivation can be understood in terms of two broad categories: full sleep deprivation and partial sleep deprivation.

- Full sleep deprivation** is when an individual has no sleep within a 24-hour-period.
- Partial sleep deprivation** is when an individual sleeps for some duration within a 24-hour-period, but the sleep duration is too short, or the quality of sleep is poor. Partial sleep deprivation is based on an individual's needs as some individuals may require a greater duration of sleep to feel fully rested. However, if a person has not slept for the time required for their age, or if their sleep has lacked quality, they may be partially sleep deprived. In this way, partial sleep deprivation involves both quantity and quality of sleep.

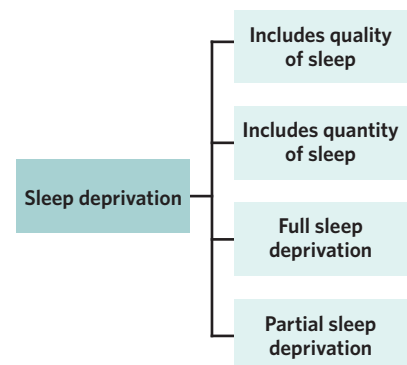


Figure 1 Sleep deprivation

LESSON LINK

How many hours of sleep counts as sleep deprivation? As you learnt in lesson **6D Sleep across the lifespan**, the number of hours of sleep a person requires changes during different stages of life. Therefore, sleep deprivation is different for each person depending on their stage in life. The important thing to keep in mind about sleep deprivation is that a person is considered sleep deprived if they haven't had enough adequate sleep in comparison to how much sleep they normally need, which can vary between individuals.

Effects of sleep deprivation 4.1.4.2

Sleep deprivation can negatively influence an individual's functioning. In this section of the lesson, you will learn about how sleep deprivation can impact affective functioning, behavioural functioning, and cognitive functioning.

Theory details

Both full and partial sleep deprivation have negative effects on an individual's ability to function. Specifically, they have adverse effects on people's emotions, behaviours, and ability to think clearly. These can be described as:

- affective effects
- behavioural effects
- cognitive effects, respectively.

Affective effects of sleep deprivation 4.1.4.2.1

'Affect' is a term used in psychology to describe the experience, regulation, and expression of emotions. Therefore, **affective effects** refer to the changes in emotions and emotional responses that arise from sleep deprivation.

Some affective effects of sleep deprivation include:

- poor emotional regulation; resulting in amplified emotional responses that are out of proportion (exaggerated) in comparison to normal emotional responses
- irritability and moodiness
- increase in negative emotions
- reduced ability to cope with stress
- difficulty judging other people's emotions
- reduced empathy towards others
- impaired ability to appropriately respond to situations; thus, people may overreact (emotionally) to minor things and experience emotional outbursts
- increase in aggression and impatience
- increase in mood swings.

WANT TO KNOW MORE?

Although sleep deprivation mainly leads to amplified emotional responses, studies have shown that it can also occasionally dull emotional reactions. This can include having dampened facial expressions, which often leads to reduced social and emotional wellbeing if experienced for a long period of time (Minkel et al., 2011).

Behavioural effects of sleep deprivation 4.1.4.2.2

Behavioural effects refer to the changes in actions and the ability to control them that arise from sleep deprivation. Behavioural effects are the observable changes in behaviour.

Some behavioural effects of sleep deprivation include:

- sleep inertia (sense of disorientation after waking)
- excessive sleepiness during the day
- increased likelihood of engaging in risk-taking behaviours
- fatigue/lack of energy

USEFUL TIP

You can remember the effects of sleep deprivation through the abbreviation 'ABC'. This stands for the three types of effects a person might experience.

- **A**ffective
- **B**ehavioural
- **C**ognitive

Affective effects (relating to sleep deprivation) the changes in emotions and emotional responses that arise from sleep deprivation

Behavioural effects (relating to sleep deprivation) the changes in actions and the ability to control them that arise from sleep deprivation

- slowed reaction time
- reduced efficiency; thus, it takes more time to complete tasks
- reduced motor control and heightened clumsiness, contributing to higher rates of accidents and injuries
- involuntary lapses into microsleeps (where the individual briefly falls asleep for a few seconds without awareness of doing so)
- diminished social functioning and impaired control of behaviour.

Cognitive effects

(relating to sleep deprivation) the changes in mental processes that arise from sleep deprivation

Cognitive effects of sleep deprivation 4.1.4.2.3

Cognition refers to the mental processes an individual performs in order to understand and process information. Therefore, **cognitive effects** refer to the changes in mental processes that arise from sleep deprivation.

Some cognitive effects of sleep deprivation include:

- reduced concentration
- impairment of short-term memory; thus, diminishing the ability to actively process and mentally manipulate information
- diminished ability to perform cognitive tasks, particularly as the duration of the task increases
- lapses in attention
- impaired decision-making processes and problem-solving abilities
- diminished creativity and ability to utilise abstract thought
- reduced retention of information; thus, impaired learning and memory processes
- irrational and/or illogical thinking
- more time spent analysing situations and a greater likelihood of overlooking important details
- impaired visual and spatial ability.

WANT TO KNOW MORE?

Long-term sleep deprivation (also known as chronic sleep deprivation) can also lead to an increased risk for many diseases and health problems, including:

- raised blood pressure
- increased risk of developing diabetes
- lowered immunity, increasing susceptibility to illness
- increased risk of cardiovascular disease
- increased risk of obesity
- increased risk of depression and anxiety.

Comparing sleep deprivation to blood alcohol concentration (BAC) 4.1.4.3

Believe it or not, the effects of alcohol on emotions and concentration are similar to that of sleep deprivation. In this section of the lesson, you will learn about how sleep deprivation compares to blood alcohol concentration (BAC).

Theory details

Blood alcohol concentration (BAC) is a measure of how much alcohol is in a person's bloodstream. If a person's BAC is 0.05, there are 0.05 grams of alcohol for every 100 millilitres of blood in that person's body. Because alcohol is a depressant drug, it will slow down the nervous system and decrease alertness, concentration, reflexes, and decision-making. In this way, the higher a person's BAC, the more their cognition and affect might be impaired or changed.

Blood alcohol concentration (BAC)

a measure of how much alcohol is in a person's bloodstream

The comparison of the effect of BAC and sleep deprivation on consciousness comes from the research of Australian psychologists Dawson and Reid (1997). Their participants were required to complete cognitive-motor tasks in one of two conditions: after sleep deprivation or after alcohol consumption. A within-subjects design was used. Both the alcohol and the sleep deprivation conditions gave similar results. Thus, Dawson and Reid (1997) found that:

- a BAC of 0.05 is roughly equivalent to 17 hours of sleep deprivation (partial sleep deprivation).
- a BAC of 0.10 is roughly equivalent to 24 hours of sleep deprivation (full sleep deprivation).

USEFUL TIP

Keep in mind that BAC is not just a measure of how much alcohol a person has consumed. Different people, depending on variables like age, sex, body mass, type of alcohol etc., will reach a BAC of 0.10 or 0.05 with different amounts of alcohol. As such, be careful when answering questions about the effect of alcohol on cognition and mood, and make sure the question has specified a BAC level if you are going to comment on it.

Affective effects of sleep deprivation compared to blood alcohol concentration (BAC) 4.1.4.3.1

The consumption of alcohol and sleep deprivation can both affect a person's affective functioning. Generally speaking, sleep deprivation negatively affects someone's emotional functioning, making them more irritable or sensitive. Alcohol on the other hand can have a range of effects on someone's emotions, including making them feel:

- happy and excited
- angry
- sad.

The impact of alcohol on an individual's emotional state can differ in the short-term and long-term. In the short-term, alcohol is more likely to have a range of emotional effects as previously described. However, in the long-term, alcohol is more likely to have a dulling effect on emotions as it is a depressant drug.

While sleep deprivation and alcohol consumption can have different effects, they both alter an individual's emotional state when compared to how the individual typically experiences emotions. They also are likely to have similar impacts on other aspects of affect, such as having difficulty judging the emotions of others and experiencing more amplified emotional responses.

Cognitive effects of sleep deprivation compared to blood alcohol concentration (BAC) 4.1.4.3.2

As you have learnt, cognition involves the ways individuals process and understand information from the world. A BAC of 0.10 impairs cognition in a way that is comparable to having 24 hours of sleep deprivation (full sleep deprivation), while a BAC of 0.05 impairs cognition in a way that is comparable to experiencing 17 hours of partial sleep deprivation. Such cognitive impairments can include:

- slower mental processes, such as reduced speed in processing and understanding information
- decreased ability to reason and problem solve
- greater difficulty making sense of the world
- reduced ability to make decisions quickly and effectively
- cognitive distortions.

The changes in cognition due to BAC and sleep deprivation have been researched through driving simulation tests. This may involve having three groups; a control group, an alcohol-influenced group, and a sleep-deprived group. All groups complete the same driving simulation test and their errors are recorded. Often these tests aim to examine a range of cognitive processes, including attention and decision-making.

Theory summary

In this lesson, you have learnt about sleep deprivation and its effects on functioning. You have also compared sleep deprivation with blood alcohol concentration (BAC). Figure 2 provides a summary of this lesson.

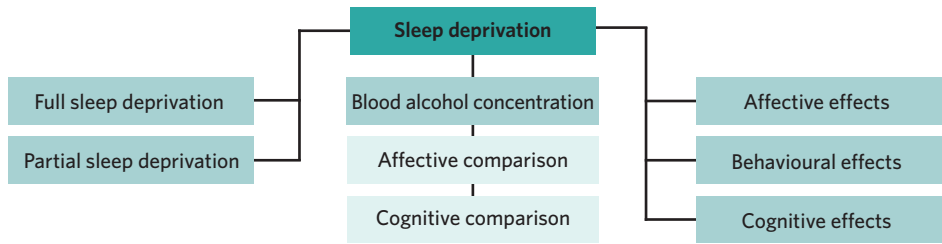


Figure 2 Summary diagram of lesson 7A

7A Questions

Theory review

Question 1

Sleep deprivation only occurs when an individual does not sleep for 24 hours.

- A. True.
- B. False.

Question 2

Sleep deprivation can _____ impact functioning.

Which of the following best fills in the blank?

- A. negatively
- B. positively
- C. neutrally

Question 3

Which of the following are impacted by sleep deprivation? **(Select all that apply)**

- I. Cognitive functioning.
- II. Behavioural functioning.
- III. Affective functioning.
- IV. Genetic functioning.

Question 4

Affective functioning relates to which of the following? **(Select all that apply)**

- I. Emotions.
- II. Irritability.
- III. Fatigue.
- IV. Concentration.

Question 5

An individual with a high blood alcohol concentration functions the same as an individual who is sleep deprived.

- A. True.
- B. False.

Assessment skills

Data analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

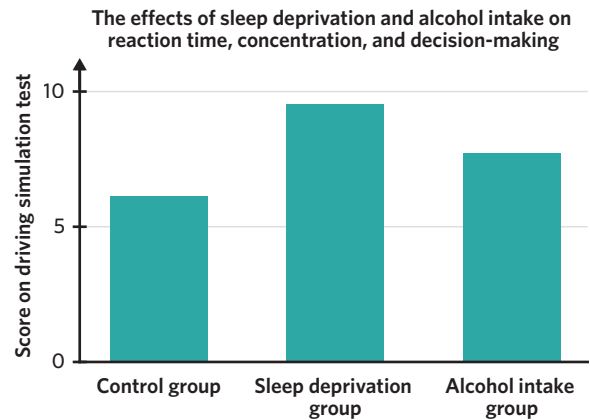
Use the following information to answer questions 6–9.

The following study looked at driving performance based on sleep deprivation and alcohol intake. Participants were separated into three groups:

- control
- sleep deprivation
- alcohol intake.

Participants were required to complete a driving simulation test, with the sleep deprivation group completing it after experiencing 24 hours of sleep deprivation, and the alcohol intake group completing it after reaching a specific BAC. The driving simulation test aimed to test reaction time, concentration, and decision-making which was reflected in one overall score. The higher the score on the driving test, the more impairment experienced by the individuals in the group. The results are shown in the following graph.

(Lowrie & Brownlow, 2020)



Question 6

What type of data was collected in this study?

- A. Quantitative data.
- B. Qualitative data.
- C. Normal data.

Question 7

Which of the following statements about the data is correct?

- A. The control group experienced more impairment than the sleep deprivation group.
- B. The sleep deprivation group experienced more impairment than the alcohol intake group.
- C. The alcohol intake group experienced more impairment than the sleep deprivation group.

Question 8

The measurement of concentration reflects

- A. affective functioning.
- B. behavioural functioning.
- C. cognitive functioning.
- D. none of the above.

Question 9

Which of the following conclusions is most supported by the data?

- A. the effects of sleep deprivation are worse than the effects of consuming alcohol on driving.
- B. the effects of sleep deprivation are the exact same as the effects of consuming alcohol on driving.
- C. the effects of sleep deprivation are better than the effects of consuming alcohol on driving.

Exam-style

Remember and understand

Question 10 (1 MARK)

Which of the following statements is the most correct?

- A. Partial sleep deprivation only accounts for the quality of sleep.
- B. Full sleep deprivation is when an individual does not sleep at all for a period of 24 hours or more.
- C. Full sleep deprivation is when an individual gets some, but not adequate, sleep within a 24-hour period.
- D. Partial sleep deprivation only accounts for the quantity of sleep.

Question 11 (1 MARK)

In terms of cognition and affect, the effects of one full night of sleep deprivation are similar to having

- A. a BAC of 0.05.
- B. a BAC of 1.00.
- C. a BAC of 0.10.
- D. a BAC of 0.5.

Question 12 (2 MARKS)

Using an example, describe the behavioural effects of sleep deprivation.

Question 13 (2 MARKS)

Suggest whether a person who is experiencing full sleep deprivation would experience similar cognitive abilities to when they have a blood alcohol concentration (BAC) level of 0.05. Justify your response.

Question 14 (3 MARKS)

Identify three affective changes a person might experience if they are sleep deprived.

Apply and analyse

Question 15 (1 MARK)

Ahmed is a healthy 34-year-old man. On Sunday night he stayed up late to watch the midnight screening of a new movie and didn't get to bed until 2am. At work on Monday, he is partially sleep deprived. Which of the following changes to Ahmed's affective and behavioural functioning are likely to occur due to his lack of sleep?

| | Affective changes | Behavioural changes |
|----|--|----------------------------------|
| A. | Increased negative mood | Reduced retention of information |
| B. | Increased irritability | Slowed reaction times |
| C. | Decreased number of errors for complex tasks | Increased risk-taking |
| D. | Hand tremors | Reduced spatial awareness |

Question 16 (1 MARK)

Solomon and Terry have a test at university today. Solomon has not slept for 24 hours as he was studying all night. Terry went out drinking and got enough sleep, but still has a BAC of 0.05 at the time of the test. It is likely that

- A. Solomon would have a greater ability to concentrate on the test than Terry.
- B. Terry would have a greater ability to concentrate on the test than Solomon.
- C. Solomon and Terry would have about the same ability to concentrate on the test.
- D. both Solomon and Terry would not be able to concentrate on the test.

Question 17 (3 MARKS)

Evan travels a lot for work and does not sleep well on flights. On his last work trip, he had to fly 29 hours from the UK to Australia, and during that time he only slept for 5 hours.

Discuss the affective, behavioural, and cognitive changes Evan might experience at work due to his sleep deprivation.

Questions from multiple lessons

Use the following information to answer questions 18–20.

Julia recently had a SAC for her psychology class. The night before the SAC Julia stayed up until 3am finishing her revision notes, and did not sleep well because she was feeling anxious about the SAC. In the morning, when she woke at 7am, she could not find her shoes and was worried that she would be late for school. She started to panic, her heart started beating rapidly and she could feel her palms getting sweaty.

Question 18 (1 MARK)

Which of the following is an example of how Julia's **affective** functioning might change following her sleep deprivation?

- A. More short-tempered.
- B. Better completion of complex tasks.
- C. Greater difficulty undertaking simple tasks.
- D. Reduced ability to process declarative memories.

Adapted from VCAA Psychology exam 2018 Q42

Question 19 (1 MARK)

Which of the following is an example of how Julia's **cognitive** functioning might change following her sleep deprivation?

- A. More short-tempered.
- B. Better completion of complex tasks.
- C. Greater difficulty understanding tasks.
- D. Increased ability to process declarative memories.

Adapted from VCAA Psychology exam 2018 Q42

Question 20 (1 MARK)

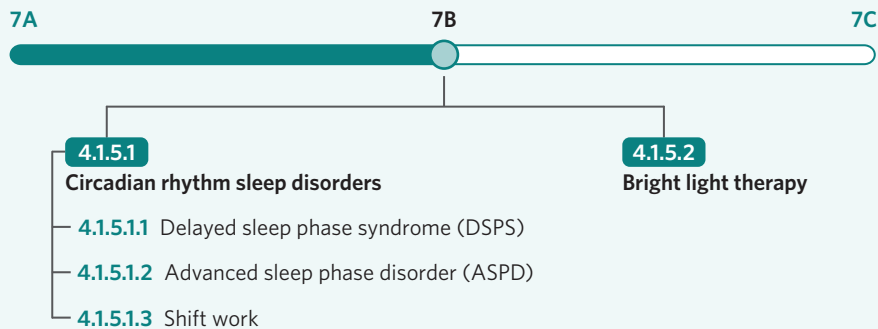
Which branch of the nervous system was active when Julia started to feel panicked?

- A. Autonomic nervous system.
- B. Parasympathetic nervous system.
- C. Somatic nervous system.
- D. Sympathetic nervous system.

7B Circadian rhythm sleep disorders

STUDY DESIGN DOT POINT

- changes to a person's sleep-wake cycle that cause circadian rhythm sleep disorders (Delayed Sleep Phase Syndrome [DSPS], Advanced Sleep Phase Disorder [ASPD] and shift work) and the treatments of circadian rhythm sleep disorders through bright light therapy



It's unlikely that your body clock is always running at the right time. Sometimes, when our body clocks are disrupted, we can experience a circadian rhythm sleep disorder. In this lesson, you will learn about circadian rhythm sleep disorders and how they can be treated using bright light therapy.

Circadian rhythm sleep disorders 4.1.5.1

In this section of the lesson, you will learn about circadian rhythm sleep disorders. Specifically, you will learn about delayed sleep phase syndrome (DSPS), advanced sleep phase disorder (ASPD), and shift work.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Sleep disorders disturbances to typical sleeping and waking patterns

Circadian rhythm sleep disorders sleep disorders that interfere with the typical regulation of the circadian rhythm of sleep, leading to a change in the sleep-wake cycle

Theory details

Sleep disorders are disturbances to typical sleeping and waking patterns. In this way, sleep disorders are broad and encompass many different types of sleep-related problems. This lesson will focus on circadian rhythm sleep disorders as a type of sleep disorder, as illustrated by figure 1.

Circadian rhythm sleep disorders are sleep disorders that interfere with the typical regulation of the circadian rhythm of sleep, leading to a change in the sleep-wake cycle.

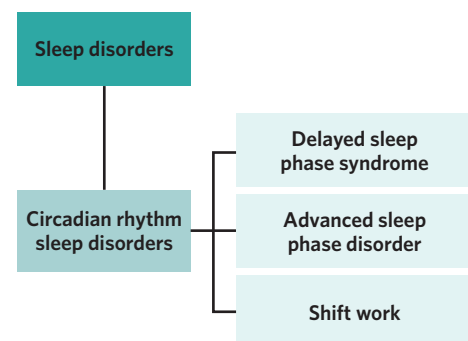


Figure 1 Sleep disorders discussed in this lesson

LESSON LINK

In lesson **6C Regulation of sleep-wake patterns**, you learnt about the circadian rhythm and how it is regulated by the suprachiasmatic nucleus and melatonin. Circadian rhythm sleep disorders, therefore, occur when the circadian rhythm is disrupted and not regulated properly, meaning that the suprachiasmatic nucleus may receive external and internal cues at abnormal times.

Table 1 broadly outlines the causes and effects of circadian rhythm sleep disorders.

Table 1 Causes and effects of circadian rhythm sleep disorders

| Causes | Effects |
|---|---|
| <p>Circadian rhythm sleep disorders are fundamentally caused by a disruption to the typical sleep-wake cycle. This can be due to a biological issue, such as the sleep-wake shift that occurs in adolescents, or lifestyle changes, such as shift work.</p> | <p>Circadian rhythm sleep disorders tend to result in an individual experiencing some form of sleep deprivation. Therefore, an individual may experience:</p> <ul style="list-style-type: none"> • amplified emotional responses • fatigue • irritability • reduced ability to concentrate. <p>Circadian rhythm sleep disorders can also be disruptive to an individual's lifestyle. Sleeping and waking at abnormal times can result in an individual being late for certain commitments, such as school, or feeling sleepy at abnormal times, which makes it difficult to complete daily tasks.</p> |

Delayed sleep phase syndrome (DSPS) 4.1.5.1.1

Delayed sleep phase syndrome (DSPS) is a type of circadian rhythm sleep disorder in which sleep and waking occur later than usual. In this way, the sleep-wake cycle is delayed. For example, if an individual typically starts sleeping at 10pm and wakes at 8am, with DSPS they may instead start sleeping at 1am and wake at 11am. Figure 2 shows sleep and wake times with DSPS.

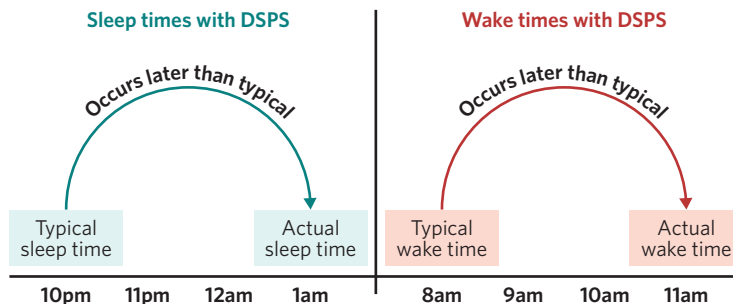


Figure 2 Sleep and wake times with DSPS

DSPS is caused by a misalignment between external and internal cues that regulate the circadian rhythm. Specifically, external cues are received at an appropriate time but internal cues are not. For example, an individual with DSPS still receives the external cues of light in the morning and dark in the night, but they do not receive internal cues properly in the morning and at night. This causes melatonin secretion to occur later and therefore the individual's sleep and wake times occur later than appropriate.

Advanced sleep phase disorder (ASPD) 4.1.5.1.2

Advanced sleep phase disorder (ASPD) is a type of circadian rhythm sleep disorder in which sleep and waking occur earlier than usual. In this way, the sleep-wake cycle is advanced. For example, if an individual typically sleeps at 10pm and wakes at 8am, with ASPD they may sleep at 7pm and wake at 5am. Figure 3 shows sleep and wake times with ASPD.

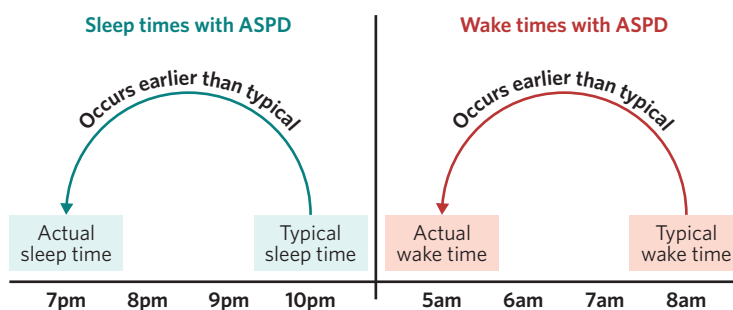


Figure 3 Sleep and wake times with ASPD

Delayed sleep phase syndrome (DSPS) a type of circadian rhythm sleep disorder in which sleep and waking occur later than usual

LESSON LINK

In lesson **6D Sleep across the lifespan**, you learnt about the sleep requirements and sleep characteristics of adolescents. This includes the biological sleep-wake shift that occurs at this age and involves delayed melatonin secretion. This shift is an example of a delayed sleep phase syndrome because adolescents sleep and wake later due to internal biological mechanisms, despite external cues.

Advanced sleep phase disorder (ASPD) a type of circadian rhythm sleep disorder in which sleep and waking occur earlier than usual

Similar to DSPS, ASPD is caused by a misalignment between external and internal cues that regulate the circadian rhythm. Specifically, external cues are being received at an appropriate time, while internal cues are not. For example, an individual with ASPD still receives the external cues of light in the morning and dark in the night, but their internal cues are not being received properly in the morning and night. This causes the individual to sleep and wake earlier than appropriate, due to melatonin secretion occurring earlier. In this way, the difference between DSPS and ASPD is that melatonin secretion occurs later for individuals with DSPS and earlier for individuals with ASPD.

Shift work 4.1.5.1.3

Shift work an occupation that involves working at unusual hours, such as working overnight

Shift work is an occupation that involves working at unusual hours, such as working overnight. This can mean an individual has to sleep at unusual times, such as during the day, rather than at night. Shift work also involves rotating shift work, which may involve working a week of morning shifts, followed by a week of night shifts. Some occupations that involve shift work include nurses, road workers, hotel staff, and drivers. Therefore, shift work impacts an individual's sleep-wake cycle as their circadian rhythm is constantly changing and adapting to their environment. This often leads to individuals having difficulty initiating sleep and waking while adjusting from one shift to another.

Shift work is considered to be a cause of sleep problems, rather than being a sleep disorder itself. In this way, shift work can result in a circadian rhythm sleep disorder, as well as or other sleep-related issues. Effects of shift work on sleep include:

- insomnia (a sleep disorder characterised by difficulty falling asleep and staying asleep). Shift work overnight can disrupt the body's circadian rhythm and can trigger insomnia.
- fragmented sleep. Shift work often involves working unusual hours and therefore having to sleep at unusual hours. This can involve repeatedly waking up during a sleep episode and having multiple short sleep episodes during the day (naps), as opposed to one regular sleep episode (approximately 8 hours).
- circadian rhythm phase disorder. External cues from the environment are out of sync with shift work requirements, as shift workers can be in highly lit environments during night-time.
- quality and quantity of sleep can be adversely affected. Due to internal cues, such as clock gene expression and suppression, the body is programmed to sleep during the night and be wakeful during the day.

While ASPD and DSPS are caused by problems with internal cues, shift work disorders are caused by problems with external cues as an individual is required to be awake when it's dark and sleep when it's light.

WANT TO KNOW MORE?

Circadian rhythm sleep disorders are only one category of sleep disorders. Two other types of sleep disorders are parasomnias and dyssomnias.

- Dyssomnias are characterised by difficulty falling, staying, or appropriately timing sleep. Dyssomnias disrupt the sleep-wake cycle and can cause an individual to lack an adequate quality or quantity of sleep. The consistent difficulty to initiate or maintain sleep can lead to excessive levels of sleepiness.
- Parasomnias involve abnormal events or activities that occur during sleep. These activities can be either physiological (e.g. sleep-walking, abnormal movement) or psychological (e.g. nightmares).

Bright light therapy 4.1.5.2

Some people sleep with their blinds open to help them wake up 'better' in the morning, due to the incoming natural light. This idea is reflected in bright light therapy, which is a treatment for sleep-related problems. You will learn about bright light therapy in this section of the lesson.

Bright light therapy a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source

Theory details

As you've learnt, circadian rhythm sleep disorders are characterised by difficulties and misalignments of circadian rhythms; bright light therapy is a treatment for these disorders.

Bright light therapy is a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source.

Over time, bright light therapy works to readjust the circadian rhythm, so that an individual's sleep and wake times are more appropriate. When an individual is exposed to the light source in the morning, the suprachiasmatic nucleus (SCN) will be signalled, promoting wakefulness through the release of cortisol. This will in turn trigger an earlier release of melatonin at night-time by the pineal gland. Consequently, the individual will fall asleep earlier at night-time and thus experience a longer and more restful sleep which will benefit the individual the following day. This change occurs over a period of time involving multiple sessions of bright light therapy.

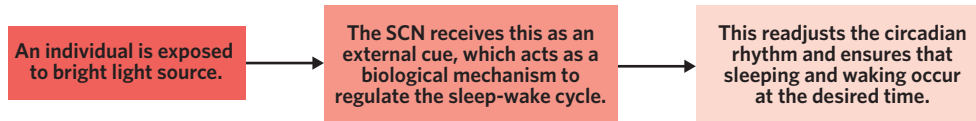


Figure 4 Bright light therapy and the SCN

Exposure sessions can last from about 15 minutes to a couple of hours and are conducted up to a few times a day. In order to readjust the sleep-wake cycle, a person needs to conduct these sessions for at least a few consecutive days. This helps to gradually shift a person's sleep-wake cycle, as they can adjust the time of the exposure session each day to reach their desired waking time. Often, minor improvements can be seen in the first few days, but a few weeks of bright light therapy is required for significant results. Table 2 presents some key factors that are necessary to ensure bright light therapy works effectively and table 3 applies the treatment of bright light therapy to the sleep disorders that you learnt about in this lesson.

Table 2 Factors essential to successful bright light therapy

| Factor | Description |
|--|---|
| Appropriate timing of exposure sessions | Bright light therapy must occur at the right time in order to make a person feel awake at the right time. For example, people who feel sleepy earlier than appropriate, such as by 5pm, can conduct an exposure session in the late afternoon or early evening in order to help them stay awake and fall asleep later at a more appropriate time. |
| The right amount of light | The intensity of the light and the length of exposure sessions must be appropriate to the person's disorder and desired changes to their circadian rhythm. The intensity and length should also be built up gradually in order to avoid negative side effects like headaches. |
| Safe exposure | A person should not look directly at the light, and their face should be an adequate distance away from the light source. |

Table 3 Bright light therapy for the sleep disorders discussed in this lesson

| Sleep disorder | How can bright light therapy be used as a treatment? |
|--|--|
| Delayed sleep phase syndrome | An individual is exposed to the bright light source in the morning at an appropriate waking time. This will act as an external cue to the suprachiasmatic nucleus and promote wakefulness, by sending signals to release cortisol. This will help the suprachiasmatic nucleus send signals for melatonin release at an earlier, more appropriate sleeping time, thus promoting sleep. |
| Advanced sleep phase disorder | An individual is exposed to the bright light source in the evening when feeling sleepy, to act as an external cue to the suprachiasmatic nucleus and promote wakefulness. This will then help the suprachiasmatic nucleus send signals for melatonin release at a later, more appropriate sleeping time, thus promoting sleep. Additionally, this will encourage the suprachiasmatic nucleus to signal cortisol release later in the morning at a more appropriate time. |
| Shift work-related sleep disorder | The use of bright light therapy for shift work depends on the details and timing of an individual's work. An individual is best to be exposed to the bright light source before beginning their shift work, in order to promote wakefulness when they need to be awake and alert. This will help promote sleepiness at a later, more suitable time (when they are not required to work), whether that be during the morning or afternoon. |

LESSON LINK

In figure 4, you can see how bright light therapy involves the suprachiasmatic nucleus. This relies on your knowledge from lesson **6C Regulation of the sleep-wake cycle**, in which you learnt about the way the suprachiasmatic nucleus receives and uses external cues to help promote wakefulness and sleepiness at appropriate times. In this way, bright light therapy uses light as an external cue to promote wakefulness in the morning and sleepiness at night-time.

Theory summary

In this lesson, you learnt about circadian rhythm sleep disorders, as well as bright light therapy as a possible treatment option. Figure 5 presents a summary of this lesson.

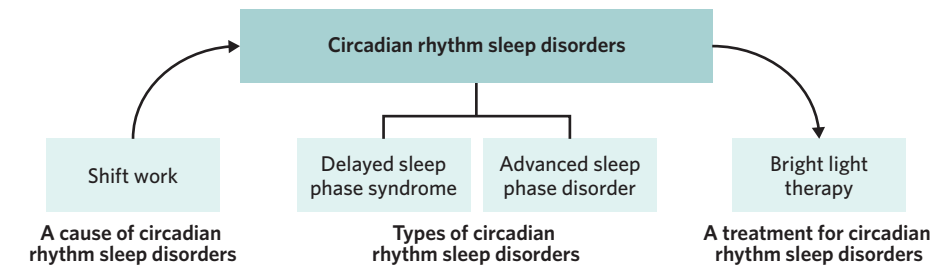


Figure 5 Summary of lesson 7B

7B Questions

Theory review

Question 1

Sleep disorders can involve disruptions to sleep.

- A. True.
- B. False.

Question 2

Sleep disorders can involve which of the following? **(Select all that apply)**

- I. Changes to the sleep-wake cycle.
- II. Falling asleep earlier than typical and waking earlier than typical.
- III. Falling asleep later than typical and waking later than typical.

Question 3

Circadian rhythm sleep disorders are only caused by lifestyle changes.

- A. True.
- B. False.

Question 4

Which of the following are types of sleep disorders? **(Select all that apply)**

- I. Shift work.
- II. Delayed sleep phase syndrome.
- III. Advanced sleep phase disorder.

Question 5

Bright light therapy is an effect of circadian rhythm sleep disorders.

- A. True.
- B. False.

Question 6

Which of the following is important in bright light therapy? (Select all that apply)

- I. Appropriate timing of exposure sessions.
- II. The right amount of light.
- III. Safe exposure.
- IV. Exposure to light only at night-time.

Assessment skills

Perfect your phrasing

Question 7

Which of the following statements is most correct?

- A. Circadian rhythm sleep disorders **inhibit** the typical regulation of the circadian rhythm of sleep, leading to a **disruption** in the sleep-wake cycle.
- B. Circadian rhythm sleep disorders **interfere** with the typical regulation of the circadian rhythm of sleep, leading to a **change** in the sleep-wake cycle.

Question 8

Which of the following statements is most correct?

- A. Delayed sleep phase syndrome (DSPS) is a type of circadian rhythm sleep disorder in which sleep and waking are **delayed**.
- B. Delayed sleep phase syndrome (DSPS) is a type of circadian rhythm sleep disorder in which sleep and waking are **reduced**.

Question 9

Which of the following statements is most correct?

- A. Advanced sleep phase disorder (ASPD) is a type of circadian rhythm sleep **disruption** in which sleep and waking are advanced.
- B. Advanced sleep phase disorder (ASPD) is a type of circadian rhythm sleep **disorder** in which sleep and waking are advanced.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies, and methods, and findings from three student practical activities

Question 10

Which of the following correctly outlines a similarity between delayed sleep phase syndrome (DSPS) and advanced sleep phase disorder (ASPD)?

- A. DSPS and ASPD both involve advanced sleep-wake patterns.
- B. DSPS and ASPD both involve a disruption to sleep-wake patterns.
- C. DSPS and ASPD both involve irregular sleep times and regular wake times.

Question 11

Which of the following correctly outlines a difference between delayed sleep phase syndrome (DSPS) and advanced sleep phase disorder (ASPD)?

- A. DSPS involves sleeping and waking later than appropriate, whereas ASPD involves sleeping and waking earlier than appropriate.
- B. DSPS involves sleeping and waking earlier than appropriate, whereas ASPD involves sleeping and waking later than appropriate.
- C. DSPS is a disorder that only occurs in children, whereas ASPD only occurs in teenagers.

Question 12

Which of the following correctly outlines a difference between the circadian rhythm sleep phase disorders DSPS and ASPD, and shift work-related sleep disorders?

- A. DSPS and ASPD involve disruptions to external cues, while shift work-related sleep disorders involve disruptions to internal cues.
- B. DSPS and ASPD involve disruptions to external cues, while shift work-related sleep disorders involve disruptions to external cues.
- C. DSPS and ASPD involve disruptions to internal cues, while shift work-related sleep disorders involve disruptions to external cues.
- D. DSPS and ASPD involve disruptions to internal cues, while shift work-related sleep disorders involve disruptions to internal cues.

Exam-style**Remember and understand****Question 13** (1 MARK)

A circadian rhythm sleep disorder is best described as

- A. a sleep disorder in which sleep and waking are delayed.
- B. a sleep disorder in which sleep and waking are advanced.
- C. a sleep disorder that interferes with the typical regulation of the circadian rhythm of sleep.
- D. a sleep disorder that biologically changes the sleep-wake cycle.

Question 14 (1 MARK)

Describe bright light therapy.

Question 15 (2 MARKS)

Describe how shift work can result in a circadian rhythm sleep disorder.

Apply and analyse**Question 16** (1 MARK)

Koko is a year 12 student. During the week, she begins to feel sleepy at around midnight and usually doesn't fall asleep until 1am or 2am, even though she has to wake up for school at 6am. She often feels really tired for the first hours of being awake.

Koko is likely to be experiencing

- A. delayed sleep phase syndrome.
- B. advanced sleep phase disorder.
- C. a shift work-related sleep disorder.
- D. both a shift work-related sleep disorder and advanced sleep phase disorder.

Question 17 (1 MARK)

Poppy is a baker who has to work night shifts. Five nights a week she has to work from 1am to 7am, and suffers from difficulty sleeping on the nights she does not have to work as she feels very awake. Poppy's doctor has recommended that she use bright light therapy.

Bright light therapy will help Poppy by resetting

- A. her ultradian rhythms as she is experiencing a circadian rhythm sleep disorder.
- B. her ultradian rhythms as she is experiencing delayed sleep phase disorder.
- C. her circadian rhythms as she is experiencing advanced sleep phase disorder.
- D. her circadian rhythms as she is experiencing a shift work-related sleep disorder.

Question 18 (5 MARKS)

Nelson is experiencing advanced sleep phase disorder. They are often ready to sleep at 6–7pm and wake up at 3–4am feeling energised and ready to start the day.

- State the cues Nelson's suprachiasmatic nucleus (SCN) would or would not be receiving. (2 MARKS)
- Discuss how Nelson's circadian rhythm sleep disorder could be treated by bright light therapy. (3 MARKS)

Evaluate**Question 19** (3 MARKS)

Sam is a middle-aged man who has been struggling with his sleep and has been diagnosed with delayed sleep phase syndrome (DSPS) by his doctor, Dr Smith. Sam has been falling asleep around 1–2am and when he doesn't have to get up for work, he sleeps in until 12pm. This is problematic because on weekdays Sam has to be up at 6am for work, therefore he is not getting enough sleep. Dr Smith has decided to use bright light therapy to help Sam's situation. Dr Smith decides to expose Sam to a bright light source at 7am every day for 2 minutes for a period of one week. Dr Smith has told Sam to stare directly into the bright light source.

Using your knowledge of factors influencing bright light therapy, evaluate the use of bright light therapy by Dr Smith.

Questions from multiple lessons**Question 20** (5 MARKS)

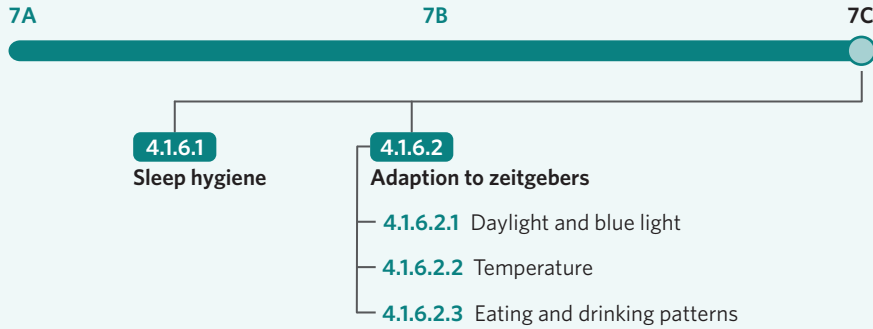
Tahlia is a sleep specialist. She has many clients who are shift workers and have difficulty sleeping. They report feeling extremely fatigued, and many of them are seeking help from her after an accident occurring at their workplace due to excessive sleepiness. Tahlia helps her clients by implementing measures to change their sleep-wake cycles, allowing for better quality and quantity of sleep.

- Briefly explain why Tahlia's clients may have difficulty sleeping due to shift work. (2 MARKS)
- Identify a cognitive effect of sleep deprivation that Tahlia's clients may experience. (1 MARK)
- Suggest potential EEG readings that Tahlia's clients may show when they are feeling extremely sleepy at work. Justify your response. (2 MARKS)

7C Improving sleep

STUDY DESIGN DOT POINT

- improving sleep hygiene and adaptation to zeitgebers to improve sleep-wake patterns and mental wellbeing, with reference to daylight and blue light, temperature, and eating and drinking patterns



So far in this chapter, you have learnt all about sleep-related problems and the negative effects of poor sleep. However, it is not all doom and gloom! There are many ways you can improve your sleep. In this lesson, you will learn about how to improve your sleep. Specifically, you will learn about sleep hygiene and how sleep-wake patterns are influenced by zeitgebers.

Sleep hygiene 4.1.6.1

When you think of hygiene, you may think about washing your hands and showering regularly. Therefore, it may seem strange to refer to sleep as ‘hygienic’ or ‘unhygienic’. However, sleep hygiene is a term used to describe the habits and practices related to sleep. In this section of the lesson, you will learn about sleep hygiene and how it improves our sleep-wake patterns and our mental wellbeing.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Sleep hygiene

the practices and habits that promote an individual’s sleep patterns

Theory details

Sleep hygiene is a term used to describe the practices and habits that promote an individual’s sleep patterns. Sleep hygiene is positive and beneficial, as it improves the quality and quantity of sleep. In this way, a lack of sleep hygiene involves having sleep practices that do not promote the quality and quantity of sleep. Sleep hygiene involves:

- time; sleeping and waking at a time that enables an adequate amount of sleep, and sleeping and waking at a consistent time each day.
- sound; sleeping in a fairly quiet space.
- light; sleeping in a dark space and reducing bright light exposure close to sleeping time.
- comfort; sleeping in a comfortable space.
- technology/devices; avoiding bright screen use close to sleeping time.
- association with bed; avoiding doing activities other than sleeping in bed (like studying or watching TV).
- food and drink consumption; avoiding large meals, caffeine, and alcohol before sleeping time.
- exercise; engaging in exercise early in the day and avoiding exercise close to sleeping time.

Therefore, sleep hygiene improves sleep-wake patterns by making it easier to fall asleep at an appropriate time and increasing the likelihood of experiencing quality sleep. Figure 1 explores examples of sleep hygiene practices.

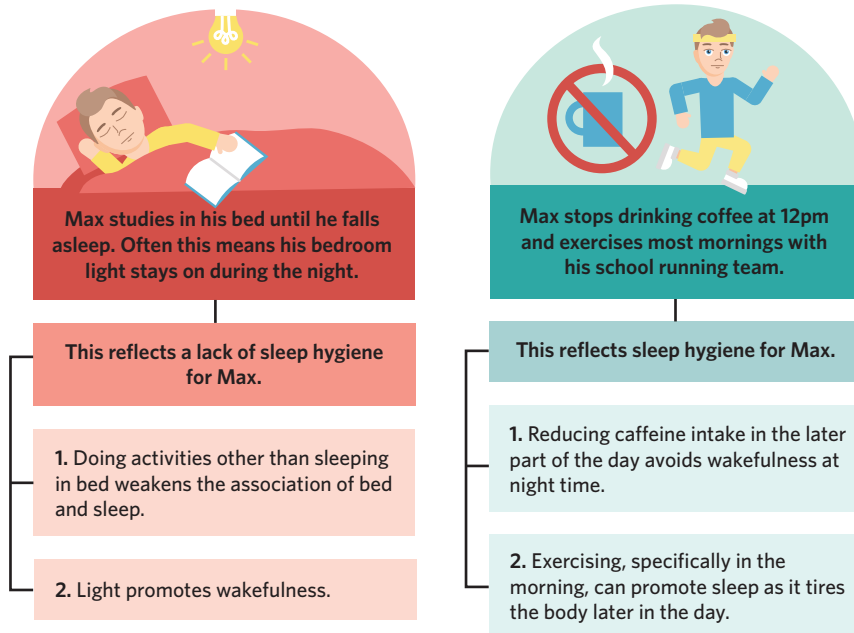


Figure 1 Examples of sleep hygiene practices

Sleep hygiene also can influence mental wellbeing. **Mental wellbeing** is an individual's psychological state, involving their ability to think, process information, and regulate emotions. Sleep hygiene enables individuals to experience good quality sleep of an adequate quantity, and sleep is important for mental wellbeing. Research suggests there is a link between poor sleep (sleep deprivation and/or sleep-related problems) and mental illness (Pigeon et al., 2017; Scott et al., 2017). Thus, good sleep is likely to reduce the likelihood of mental health problems and promote mental wellbeing. The relationship between sleep and mental wellbeing is bidirectional, meaning that sleep can impact mental wellbeing and mental wellbeing can impact sleep. This is reflected in figure 2.

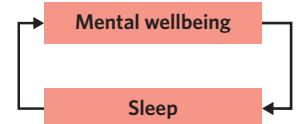
LESSON LINK

In lesson **7A Sleep deprivation**, you learnt that sleep deprivation involves both the quantity and quality of sleep. In this way, sleep hygiene works to improve not only the quantity of sleep but also the quality of sleep. Remember that quality of sleep refers to the proportion of REM and NREM, and the number of disruptions and/or awakenings during the sleep episode.

Mental wellbeing

an individual's psychological state, involving their ability to think, process information, and regulate emotions

Poor **mental wellbeing** can contribute to poor **sleep**



Poor **sleep** can contribute to poor **mental wellbeing**

Figure 2 The bidirectional relationship between sleep and mental wellbeing

Zeitgebers external cues from the environment that influence the circadian rhythm

Adaption to zeitgebers 4.1.6.2

You're probably aware that drinking coffee late in the day is not good for your sleep. But did you know that eating spicy foods close to bedtime can also negatively impact your sleep? In this section of the lesson, you will learn about zeitgebers and how they impact sleep-wake patterns.

Theory details

Zeitgebers are external cues from the environment that influence the circadian rhythm. The body treats zeitgebers as signals that regulate the circadian rhythm, and they consequently help to promote sleepiness and wakefulness at appropriate times. There are many different zeitgebers, including light, temperature, eating and drinking patterns, and exercise. Figure 3 displays the zeitgebers you will learn about in this section of the lesson.

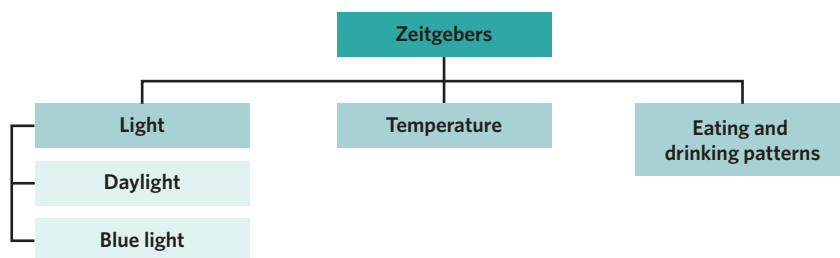


Figure 3 Zeitgebers that you will learn about in this lesson

Daylight (in relation to zeitgebers) the typical light an individual is exposed to during the day, and is mostly natural blue light

Blue light (in relation to zeitgebers) a type of light that can be emitted both naturally and artificially

Daylight and blue light 4.1.6.2.1

One of the most well-known zeitgebers is light. As you have previously learnt, light acts as an external cue by signalling to the suprachiasmatic nucleus to promote sleep or wakefulness.

Blue light is a type of light that can be emitted both naturally and artificially. **Daylight** is the typical light an individual is exposed to during the day, and is mostly natural blue light. Blue light can also be emitted through artificial sources, such as technological devices. This is reflected in figure 4. Table 1 discusses how daylight and artificial blue light work as zeitgebers that influence the circadian rhythm.

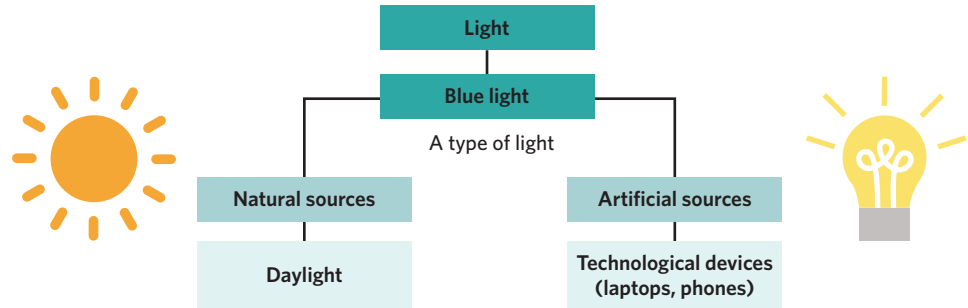


Figure 4 Light as a zeitgeber

Table 1 How light acts as a zeitgeber

| Type of light | How does it act as a zeitgeber? |
|-----------------------|---|
| Daylight | Daylight, which is predominantly natural blue light, regulates the sleep-wake cycle by signalling to the suprachiasmatic nucleus (SCN) to cease melatonin production and promote wakefulness. Thus, daylight acts as a zeitgeber. |
| Artificial blue light | Similarly to daylight (natural blue light), artificial blue light can also act as a zeitgeber. Artificial blue light can also act as an external cue in the same way that daylight does, thus promoting wakefulness. In this way, exposure to natural or artificial blue light at night time can reduce sleepiness. |

LESSON LINK

In lesson **6C Regulation of the sleep-wake cycle**, you learnt about the presence and absence of light as an external cue that is involved in signalling to the suprachiasmatic nucleus to help regulate sleep and wake times. This is how light acts as a zeitgeber.

PSYCHOLOGY EXPLORATION

Technological devices, such as phones and laptops, emit artificial blue light. Thus, significant research has been conducted on the link between using these devices at bedtime and poor sleep. Research suggests that using technological devices close to sleep can negatively impact the quality and quantity of sleep experienced. A 2020 study 'Effects of Mobile Use on Subjective Sleep Quality' (Rafique et al, 2020) found that mobile phone use prior to sleep without a blue light filter caused a decrease in sleep quality and an increase in sleep latency (time taken to fall asleep). This can be partially attributed to the blue light emitted from phones, as this acts as an external cue to the SCN that promotes wakefulness and reduces sleepiness.

Temperature 4.1.6.2.2

Temperature is the degree of external heat in the environment that can influence the quality and quantity of sleep. Research suggests there is a link between having a cool room temperature and experiencing improved quantity and quality of sleep. It is thought that this is because body temperature drops during sleep, thus, a cooler room temperature helps body temperature cool. Research contends that 18.3 degrees celsius is an ideal room temperature for sleep. Additionally, research suggests that extreme temperatures (very high or very low) are not good for sleep quality and quantity (Lan et al, 2017; Mizuno, 2012).

Temperature (in relation to zeitgebers) the degree of external heat in the environment that can influence the quality and quantity of sleep

USEFUL TIP

It is important to understand that temperature as a zeitgeber is focused on room temperature, rather than body temperature. This is because zeitgebers are environmental cues that are external to the body. In this way, body temperature is not truly a zeitgeber, but room temperature is.

Eating and drinking patterns 4.1.6.2.3

Eating and drinking patterns refer to what, when, and how much food and drink is consumed by an individual. Our eating and drinking patterns are considered a zeitgeber because they can impact the quality and quantity of our sleep. This is explored in table 2 and table 3.

Table 2 How eating and drinking patterns impact sleep

| | How does this impact sleep? |
|----------------------------------|---|
| What we eat and drink | <p>The types of food and drink an individual consumes can influence the quality and quantity of sleep; some foods can negatively impact sleep and some can positively impact sleep. Some of the foods and drinks that can impact the quality and quantity of sleep include:</p> <ul style="list-style-type: none"> • caffeine • alcohol • spicy foods • high-sugar and high-fat foods. <p>This is discussed in further detail in table 3.</p> |
| When we eat and drink | <p>Eating too close to sleep time can make it harder to fall asleep. Research suggests that eating food close to sleep time can impair an individual's quality and quantity of sleep, due to the stimulation of the digestive system (Chung et al., 2020; Duan et al., 2021; Faris et al., 2021).</p> |
| How much we eat and drink | <p>The amount of food we eat can also influence sleep quality and quantity. Specifically, going to sleep feeling hungry can lead to poorer sleep quality and quantity (Dixon, 2015). Additionally, eating large meals close to sleep time and going to sleep overly full can impair sleep patterns.</p> |

Table 3 How specific foods and drinks impact sleep

| Food or drink | How does this impact sleep? |
|--------------------------------------|--|
| Caffeine | <p>Caffeine is a stimulant and thus increases the activity of the nervous system, promoting wakefulness. Additionally, caffeine also blocks sleep-promoting neurotransmitters. Caffeine can be found in coffee, energy drinks, some soft drinks, and chocolate.</p> |
| Alcohol | <p>Alcohol is a depressant which can increase feelings of tiredness. Therefore, alcohol can make it easier to fall asleep; however, alcohol significantly impairs the quality of sleep. Alcohol often negatively impacts sleep in the second half of the sleep episode, in which sleep disruptions are more common (Ebrahim et al., 2013).</p> |
| High-sugar and high-fat foods | <p>Studies suggest that consuming a diet high in fatty foods and sugary foods can negatively impact sleep quality and quantity (Nisar et al., 2019).</p> |
| Spicy foods | <p>Spicy foods can increase body temperature. As you have learnt, cooler body temperatures can promote sleep. Therefore, the increased body temperature from consuming spicy foods can impair sleep. Additionally, spicy foods can stimulate and increase metabolic processes, which can make it more difficult to fall asleep (Edwards et al., 2002).</p> |

USEFUL TIP

As you can probably tell, eating and drinking patterns can act as a zeitgeber when we explore what, when, and how much we eat in a combined sense, rather than each component in isolation. How much we eat does not necessarily impact the sleep-wake cycle on its own, but if we eat too much too late, it can impact the sleep-wake cycle. Furthermore, what we eat is not necessarily going to impact the sleep-wake cycle on its own, as consuming caffeine in the early morning is not shown to have a significant impact on the sleep-wake cycle, but rather it is the timing of this caffeine consumption that can impact the sleep-wake cycle. In this way, it is important to understand that all components of eating and drinking patterns are influenced by each other when they impact the sleep-wake cycle. Therefore, it is important to remember this interaction when answering questions about eating and drinking patterns, as scenarios may explore multiple aspects of this zeitgeber.

USEFUL TIP

Because zeitgebers are external cues from the environment, they can be somewhat controlled by an individual. For example, exposure to blue light can be restricted prior to sleep by reducing screen exposure. In this way, zeitgebers can act as tools to enable sleep hygiene.

Eating and drinking patterns (in relation to zeitgebers) what, when, and how much food and drink is consumed by an individual

Theory summary

In this lesson, you have learnt about how you can improve your sleep through sleep hygiene. You also learnt about three zeitgebers: light, temperature, and eating and drinking patterns.

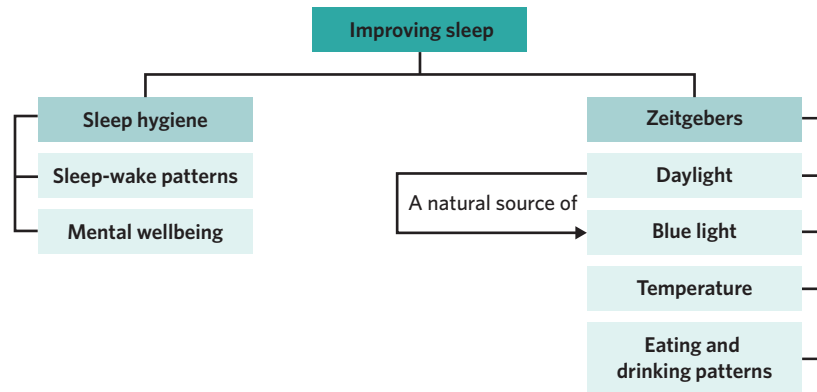


Figure 5 Summary of lesson 7C

7C Questions

Theory review

Question 1

Sleep can be improved through sleep hygiene practices.

- A. True.
- B. False.

Question 2

Which of the following can improve sleep? **(Select all that apply)**

- I. Sleeping in a comfortable space.
- II. Avoiding using bright screens close to sleep time.
- III. Consuming caffeine close to sleep time.
- IV. Exercising early in the day.

Question 3

Sleep can influence mental wellbeing. This is because research suggests there is a link between poor sleep and mental health problems.

- A. True.
- B. False.

Question 4

External cues from the environment do not play a role in sleep-wake patterns.

- A. True.
- B. False.

Question 5

Which of the following can influence the circadian rhythm? **(Select all that apply)**

- I. Light.
- II. Temperature.
- III. The number of friends someone has.
- IV. Eating patterns.

Assessment skills

Perfect your phrasing

Question 6

Which of the following is most correct?

- A. Zeitgebers are **external** cues from the environment that **influence** the circadian rhythm.
- B. Zeitgebers are **outside** cues from the environment that **impair** the circadian rhythm.

Question 7

Which of the following is most correct?

- A. Sleep hygiene is a term used to describe the **practices** and habits that **promote** an individual's sleep.
- B. Sleep hygiene is a term used to describe the **thoughts** and habits that **increase** an individual's sleep.

Text analysis

The following assessment skills type reflects the study design assessment dot point:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 8-11.

Media text 1

There are many ways you can try to improve your sleep, such as meditation and sleep supplements. However, many people are not aware of the role that diet plays in sleep. Research has suggested that there is a link between sleep and diet. For example, sleep is necessary for regulating appetite-related hormones. Therefore, what you eat and drink might just be the secret to getting a long restful sleep. Here are four changes recommended by dietitians that you can make to help you sleep:

1. Reduce the amount of alcohol you drink at night.
2. Make sure you eat enough during the day.
3. Avoid eating large meals close to bedtime.
4. Limit caffeine intake.

(Strong, 2021)

Media text 2

Phone use can impact our sleep not only through bright light, but also through the type of content we are exposing ourselves to close to bed time. For example, engaging in something stressful on your phone, such as work emails, can impact your ability to sleep well. Many people use their phones close to bedtime, so it may seem unrealistic or difficult to completely eliminate phone use before sleep. Here are some tips on how to use your phone in a smarter way to improve your sleep:

1. Be careful about the content you are consuming on your phone, and avoid checking work-related emails or stress-provoking notifications.
2. Use settings on your phone that block blue light.
3. Try not to mindlessly scroll on social media. This will help you to stay in control of how long you spend on your phone.
4. Try meditation instead of going on your phone.

It is recommended to use your phone as a 'tool to increase your sense of serenity' before sleep.

(Wilson, 2022)

Question 8

Media text 1 suggests that what you eat and drink can influence your sleep. Which of the following terms can be used to describe this influence?

- A. Zeitgebers.
- B. Sleep quality and quantity.
- C. Sleep factors.

Question 9

Media text 2 suggests that using a phone setting that blocks blue light will improve sleep. This is because

- A. blue light can negatively influence sleep-wake patterns by encouraging the release of melatonin, resulting in increased wakefulness.
- B. blue light can negatively influence sleep-wake patterns by inhibiting the release of melatonin, resulting in increased wakefulness.
- C. blue light can positively influence sleep-wake patterns by encouraging the release of melatonin, resulting in increased sleepiness.

Question 10

Media text 1 suggests that reducing alcohol intake will help promote a long and restful sleep. This is because

- A. alcohol is a depressant which makes it easier to fall asleep.
- B. alcohol is a depressant which makes it harder to fall asleep.
- C. alcohol reduces the quality of sleep.

Question 11

If an individual was to combine the advice from both media text 1 and media text 2, which of the following options would correctly describe their actions?

- A. An improvement in sleep hygiene practices, involving a change in eating and drinking patterns and a reduction in blue light exposure close to sleep time.
- B. A reduction in sleep hygiene practices, involving a change in eating and drinking patterns and reduction in blue light exposure close to sleep time.
- C. No change in sleep hygiene practices would be necessary.

Exam-style**Remember and understand****Question 12** (1 MARK)

Sleep hygiene is

- A. the cleanliness of an individual's sleep environment.
- B. the practice and habits that promote an individual's sleep.
- C. the quality and quantity of an individual's sleep.
- D. external cues from the environment that influence the circadian rhythm.

Question 13 (1 MARK)

Which of the following is most true of zeitgebers?

- A. Zeitgebers are external cues and therefore they come from the environment.
- B. Zeitgebers regulate ultradian rhythms.
- C. Zeitgebers include body temperature, light, and exercise.
- D. Zeitgebers cannot be altered or changed by an individual.

Question 14 (2 MARKS)

Using an example, describe how sleep hygiene can improve sleep-wake patterns.

Question 15 (2 MARKS)

Outline how sleep hygiene can improve mental wellbeing.

Question 16 (2 MARKS)

With reference to daylight and blue light, explain how zeitgebers can influence sleep-wake patterns.

Apply and analyse

Use the following information to answer questions 17 and 18.

Cora loves the taste of coffee and drinks it all the time during the day. Cora often drinks a cup of coffee after she has her dinner, around 8pm.

Question 17 (1 MARK)

Cora's coffee consumption may influence her sleep-wake patterns by

- A. acting as an internal bodily cue that promotes her sleep-wake patterns, as caffeine makes it easier to fall asleep.
- B. acting as an internal bodily cue that impairs her sleep-wake patterns, as caffeine makes it harder to fall asleep.
- C. acting as an external environmental cue that promotes her sleep-wake patterns, as caffeine makes it easier to fall asleep.
- D. acting as an external environmental cue that impairs her sleep-wake patterns, as caffeine makes it harder to fall asleep.

Question 18 (1 MARK)

Cora's coffee consumption close to sleep-time is also an example of

- A. a lack of sleep hygiene.
- B. sleep hygiene.
- C. poor mental wellbeing.
- D. poor sleep quality and quantity.

Question 19 (6 MARKS)

Mallena has decided to try and improve her sleep. Mallena knows that she needs to change her routine before bed. Currently, Mallena stays up late on her phone before bed or she studies late in her bed, which she thinks is probably not helping her sleep issues. She is unsure of what other things she can do to help improve her sleep, but she would like to try a few different techniques so that she can have the best chance of getting better sleep.

With reference to her current practices and potential new practices, discuss how Mallena could use both sleep hygiene and zeitgebers to improve her sleep-wake patterns.

Evaluate

Question 20 (3 MARKS)

Yusuf is in his early twenties and has been finding it hard to fall asleep and stay asleep. He tends to wake up really tired in the morning. Yusuf's friend Veronica suggested that he should drink a glass of wine before sleep as this always makes her feel sleepy. Veronica also advised Yusuf to drink coffee when he feels tired, to help him get through the day.

Evaluate whether Veronica's advice is likely to be effective for Yusuf.

Questions from multiple lessons

Question 21 (2 MARKS)

Akira is struggling with their sleep. They have been reading about sleep hygiene practices that they can implement in their routine to try and improve their sleep quality and quantity. Akira is aiming to introduce five sleep hygiene practices into their routine. These are: exercising in the morning, avoiding caffeine near sleep time, avoiding electronic devices near sleep time, sleeping in a dark room, and not sleeping in a noisy environment. To help Akira remember these she has summarised them as:

- exercise
- caffeine
- electronic devices
- dark
- noise.

Suggest a mnemonic device that Akira could use to remember these five sleep hygiene practices.

Chapter 7 review

Chapter summary

This chapter was all about the changes and disruptions that can occur to sleep-wake patterns. You also learnt about ways sleeping and waking can be improved.

In lesson **7A Sleep deprivation**, you learnt about both partial and full sleep deprivation. In particular, you learnt about:

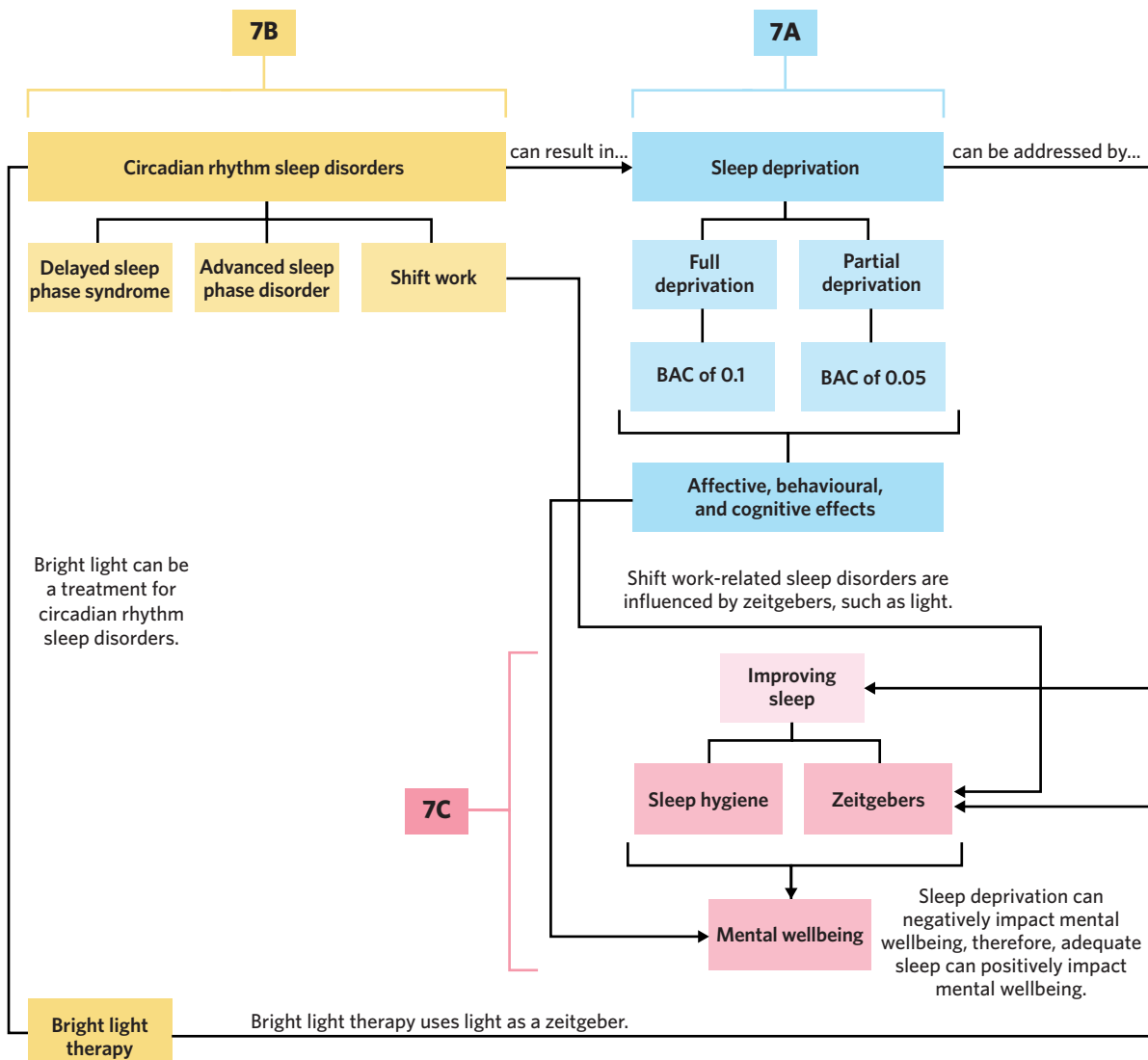
- the affective, behavioural, and cognitive effects of sleep deprivation
- the affective and cognitive effects of blood alcohol concentration (BAC) in comparison to sleep deprivation.

In lesson **7B Circadian rhythm sleep disorders**, you learnt about how the circadian rhythm can be disrupted and impair sleeping and waking. In particular, you learnt about:

- delayed sleep phase syndrome (DSPS)
- advanced sleep phase disorder (ASPD)
- sleep disorders as a result of shiftwork
- bright light therapy as a potential treatment for circadian rhythm sleep disorders.

In lesson **7C Improving sleep**, you learnt about sleep hygiene and zeitgebers. In particular, you learnt about:

- how sleep hygiene can be used to improve sleeping and waking patterns
- light, temperature, and eating and drinking patterns as zeitgebers that can influence the circadian rhythm.



Chapter review activities

Review activity 1: Key terms

Fill in the table with descriptions for key terms across this chapter.

| Factor | Description |
|---|-------------|
| Sleep deprivation | |
| Full sleep deprivation | |
| Partial sleep deprivation | |
| Affective effects (relating to sleep deprivation) | |
| Behavioural effects (relating to sleep deprivation) | |
| Cognitive effects (relating to sleep deprivation) | |
| Blood alcohol concentration (BAC) | |
| Circadian rhythm sleep disorders | |
| Delayed sleep phase syndrome | |
| Advanced sleep phase disorder | |
| Shift work | |
| Bright light therapy | |
| Zeitgebers | |
| Sleep hygiene | |
| Daylight (as a zeitgeber) | |
| Blue light (as a zeitgeber) | |
| Temperature (as a zeitgeber) | |
| Eating and drinking patterns (as a zeitgeber) | |

Review activity 2: Label the scenario

Fill in the blanks with the following terms.

- sleep hygiene
- partial sleep deprivation
- shift work
- earlier
- bright-light therapy
- circadian rhythm
- evening
- melatonin
- similar
- depressant
- zeitgeber
- affective
- later
- melatonin
- increase
- behavioural
- advanced sleep phase disorder
- sleep-wake cycle
- suprachiasmatic nucleus

Starr works as a nurse at an aged care facility. She looks after an elderly resident, Mr Bucks, who has been having trouble sleeping. Mr Bucks complains that he has begun to feel tired at 5pm and can't stay asleep past 6am. Mr Bucks sees a doctor who diagnoses him with _____ as his sleep and waking occur _____ than usual. In order to improve his _____, the doctor suggests that Mr Bucks uses _____, which involves adjusting a person's _____ through exposure to a high-intensity light source. For his condition, it is recommended that Mr Bucks is exposed to bright light therapy in the _____ when feeling sleepy, to act as an external cue to the _____. This will signal the hormone _____ to be released at a _____ time to promote sleep at the appropriate time.

The doctor also suggests that Mr Bucks should stop drinking a glass of wine with dinner as alcohol is a _____ which can _____ feelings of tiredness. Alcohol is considered to be a _____ as it is an external cue from the environment that can influence the circadian rhythm. The doctor also suggests that Mr Bucks should sleep in a comfortable and quiet space, and avoid naps. This advice is an example of _____ practices to promote sleep.

Starr thinks she should also listen to the doctor's advice as she has been feeling tired. Starr's job as a nurse is considered _____ as she works at unusual hours and overnight. Starr sometimes only sleeps for a short amount of time within a 24-hour period and her sleep quality is generally poor, meaning she is experiencing _____. Starr notices that when she doesn't get enough sleep, she tends to be clumsier during the day, which is an example of a _____ effect of sleep deprivation. Starr also notices that on these days, she is more irritable and has less patience for the residents, which is an _____ effect of sleep deprivation. Starr also experiences cognitive effects of sleep deprivation. According to research, if she had experienced 17 hours of sleep deprivation, it is predicted that her performance on cognitive tasks would be _____ to someone with a BAC of 0.05.

Chapter 7 test

Multiple choice

Question 1 (1 MARK)

Harry is having problems with falling asleep. He struggles to stay awake late enough as he feels sleepy at 6pm. He also feels wide awake early in the morning. Which of the following best describes Harry's sleep issues?

| | Name of sleep issue | Description of sleep issue |
|----|-------------------------------|---|
| A. | Advanced sleep phase disorder | Sleeping and waking times occur earlier than usual. |
| B. | Advanced sleep phase disorder | Sleeping and waking occur at times that are out of sync with the internal body clock. |
| C. | Partial sleep deprivation | Sleep quality and quantity are inadequate. |
| D. | Delayed sleep phase syndrome | Sleeping and waking times occur later than usual. |

Adapted from VCAA Psychology 2021 exam Q31

Question 2 (1 MARK)

Which of the following would most likely suggest that an individual is experiencing an affective effect of partial sleep deprivation?

- A. An individual is experiencing microsleeps.
- B. An individual is having trouble concentrating.
- C. An individual is experiencing increased irritability and anger.
- D. An individual is feeling an increase in aches and pains.

Question 3 (1 MARK)

Which of the following options best describes zeitgebers and provides an appropriate example of a zeitgeber?

| | Description of zeitgeber | Example of a zeitgeber |
|----|--|------------------------------|
| A. | Cues from the internal body clock that influence the circadian rhythm | Temperature |
| B. | External cues from the environment that influence the circadian rhythm | Eating and drinking patterns |
| C. | Internal cues from the suprachiasmatic nucleus that influence the circadian rhythm | Eating and drinking patterns |
| D. | External cues from the environment that influence the circadian rhythm | Sleep |

Question 4 (1 MARK)

Xander works at a hotel and often has to work shifts during the night. Xander finds it difficult to be awake and alert during their night shifts and has been recommended to use bright light therapy to help this. Xander's overnight shifts often begin at 12am and finish around 7am.

Xander should expose themselves to the bright light source at approximately

- A. 7am after their shift.
- B. 12am before their shift.
- C. 2am in the middle of their shift.
- D. 12pm when they are not on their shift.

Adapted from VCAA Psychology exam 2021 Q34

Question 5 (1 MARK)

The consumption of alcohol and the effects of sleep deprivation will **not** lead to

- A. enhanced concentration abilities.
- B. reduced reaction times and cognitive distortions.
- C. a lower level of awareness while driving.
- D. reduced concentration and an increased likelihood of errors.

Short answer**Question 6** (12 MARKS)

Keisha is in year 12 and is concerned about whether she is getting enough sleep. She struggles to fall asleep at nighttime, no matter how late it is, and also struggles to wake up on time for school. Keisha was worried the night before her driving test when she realised that she would only get five hours of sleep that night.

- a. Outline which type of sleep deprivation Keisha is likely to be experiencing on the day of her driving test. Justify your response. (2 MARKS)
- b. Compare the experiences of full sleep deprivation and a BAC of 0.10 on affect and cognition. (3 MARKS)
- c. Identify examples of how Keisha's cognitive and behavioural functioning could be impacted during her driving test due to her sleep deprivation. (2 MARKS)
- d. Keisha has gone to see a sleep specialist to find out why she cannot fall asleep early enough to wake up in time for school in the morning. What might the sleep specialist tell Keisha about her sleep concerns? Justify your response. (2 MARKS)
- e. Explain how Keisha could use bright light therapy to improve her sleep. (3 MARKS)

Question 7 (8 MARKS)

Jett is beginning work as a nurse, which is going to involve him engaging in shift work. He has been advised that shift work can impair sleep-wake patterns so he is trying to implement techniques to help ensure he can get enough quality and quantity of sleep, as well as be awake and aware during his shifts.

- a. What is shift work? (1 MARK)
- b. Describe daylight and blue light as zeitgebers and suggest how they may influence Jett's sleep-wake patterns. (4 MARKS)
- c. With reference to sleep hygiene, how could Jett maintain good sleep-wake patterns and mental wellbeing despite his shift work? (3 MARKS)

Question 8 (10 MARKS)

Nelson is a healthy and busy 55-year-old man who lives alone, works full-time, and catches up with his friends regularly. When Nelson catches up with his friends they often go out late at night for drinks at a nearby bar, which he often finds difficult as he gets tired very early in the evening. Nelson also visits his daughter Amy's family twice a week for dinner. Amy has noticed that Nelson seems to be sleepy when they are having dinner around 6pm. Despite this, Nelson makes an effort to stay awake for dinner even though he feels extremely tired. Amy is concerned about her father, so she asks him whether he is sleeping well. Nelson states that he is often awake at 4am or 5am and gets tired around 6pm. He finds this hard as he is working full-time and his current sleep schedule does not align well with his work requirements and his social commitments. Because of this, Nelson finds that he doesn't sleep enough, which has started to impair his daily functioning. Amy suggests that Nelson should visit a doctor to get some advice on how to improve his sleep.

Discuss the changes to his sleep-wake cycle that Nelson is experiencing and explore how this may impair his functioning. Additionally, with reference to a range of methods used to improve sleep-wake patterns, propose what advice the doctor might give Nelson.

Unit 4 AOS 1 review

The VCE study design outlines that upon completion of this area of study, you must be able to 'analyse the demand for sleep and evaluate the effects of sleep disruption on a person's psychological functioning'.

SAC assessment 1

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and evaluation of at least one psychological case study, experiment, model or simulation

Use the following information to answer questions 1-10.

Case study: Patient - Ms Parker

Introduction

The patient (Ms Parker) is a 25-year-old woman who is experiencing significant sleep problems. Ms Parker has been referred to Dr Sloane who is a general practitioner with expertise in sleep-related issues.

About the patient

Ms Parker has reported to Dr Sloane that she struggles to get to sleep at night-time and often cannot fall asleep until extremely late. She is experiencing daytime sleepiness and often finds herself falling asleep at her desk while at work. Ms Parker works a busy office job and must be awake at seven o'clock in the morning to get ready. Her nights involve working late on her laptop or watching TV. Ms Parker also stated she drinks coffee four-five times a day and often eats very large amounts of lollies and ice cream late at night.

Initial evaluation

Dr Sloane made an initial evaluation and listed potential diagnoses for Ms Parker. These included:

- advanced sleep phase syndrome
- delayed sleep phase disorder
- shift work disorder.

Official clinical assessment

For Dr Sloane to properly understand Ms Parker's sleep patterns, Ms Parker was asked to complete a sleep diary. Ms Parker's sleep diary showed sleep patterns reflective of a circadian rhythm sleep disorder, as she reported struggling to fall asleep at night-time and to wake up in the morning. Ms Parker often reported that she would get into bed at around eleven o'clock at night and feel tired, but would not fall asleep until around two or three o'clock in the morning. Ms Parker also reported that she found it difficult to wake up on time to get to work and would feel very tired and sleepy in the morning. Dr Sloane has diagnosed Ms Parker with advanced sleep phase syndrome.

Treatment plan

Dr Sloane has recommended Ms Parker use two different treatments to help with her sleep problem. Firstly, she has been advised to use bright light therapy. Secondly, she has been advised to take a melatonin supplement 2 hours before she intends to sleep.

Question 1 (2 MARKS)

- Describe the sleep-wake cycle. (1 MARK)
- Identify one biological mechanism that plays a role in regulating the sleep-wake cycle. (1 MARK)

Question 2 (7 MARKS)

Ms Parker is experiencing partial sleep deprivation due to her sleep problem.

- What is partial sleep deprivation? (1 MARK)
- With reference to cognitive, affective, and behavioural effects of partial sleep deprivation, analyse how Ms Parker's sleep problem may impact her work performance. (6 MARKS)

Question 3 (6 MARKS)

- What is the purpose of Ms Parker's sleep diary? (1 MARK)
- Identify two points of information Ms Parker should include in her sleep diary. (2 MARKS)
- Why is using a sleep diary beneficial? (1 MARK)
- Aside from the sleep diary, describe another method Dr Sloane could have used to measure Ms Parker's sleep. (2 MARKS)

Question 4 (2 MARKS)

Explain why melatonin was recommended to Ms Parker to help treat her sleep problem.

Question 5 (2 MARKS)

Justify whether Ms Parker is getting the required sleep for her age.

Question 6 (4 MARKS)

- Identify a feature of REM sleep. (1 MARK)
- Describe the stages of NREM sleep. (3 MARKS)

Question 7 (6 MARKS)

- Describe sleep hygiene. (1 MARK)
- Justify whether Ms Parker has good sleep hygiene or not. (2 MARKS)
- With reference to zeitgebers, discuss how Ms Parker may improve her sleep problem. (3 MARKS)

Question 8 (4 MARKS)

Dr Sloane has diagnosed Ms Parker with advanced sleep phase disorder.

Is Dr Sloane's diagnosis of advanced sleep phase disorder accurate? Justify your response by analysing Ms Parker's sleep patterns in relation to circadian rhythm sleep disorders.

Question 9 (3 MARKS)

- Briefly distinguish between circadian and ultradian rhythms. (2 MARKS)
- What could a disruption to Ms Parker's ultradian rhythms look like? (1 MARK)

Question 10 (4 MARKS)

- With reference to the regulation of the sleep-wake cycle via the suprachiasmatic nucleus (SCN), discuss how bright light therapy can improve Ms Parker's sleep. (3 MARKS)
- What should Dr Sloane be careful about when treating Ms Parker with bright light therapy? (1 MARK)

Unit 4 AOS 1 review

SAC assessment 2

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 1-15.

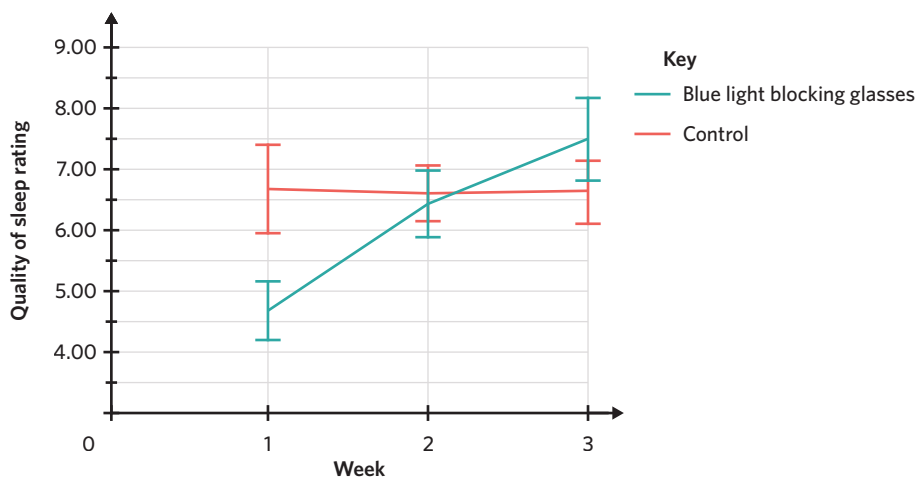
An experiment was conducted that investigated the effect of blue light blocking glasses on sleep. The experiment ran for three weeks. Participants were divided randomly into a control group and an experimental group.

For one week, all participants recorded their sleep through a sleep diary, with neither group wearing any form of glasses prior to sleep.

For the following two weeks, participants in the control group were given placebo glasses to wear three hours prior to bedtime while participants in the experimental group were given blue light blocking glasses to wear three hours prior to bedtime. All participants were required to record their sleep through a sleep diary.

The recording of sleep through sleep diaries involved participants rating their sleep quality on a scale from 1-10, in which 1 was equivalent to very poor sleep and 10 was equivalent to very good sleep.

The following graph presents the results of the experiment.



(Burkhart & Phelps, 2009)

Question 1 (3 MARKS)

Write a potential hypothesis for this experiment.

Question 2 (2 MARKS)

Identify and describe the type of research design used in this experiment.

Question 3 (2 MARKS)

Describe the type of data that has been collected in this experiment.

Question 4 (3 MARKS)

With reference to the control and experimental groups, analyse the results of this experiment.

Question 5 (4 MARKS)

With reference to zeitgebers and the sleep-wake cycle, explain why the results for the control and experimental groups occurred.

Question 6 (3 MARKS)

How can the results, obtained from the experiment, influence advice regarding sleep hygiene?

.....

Question 7 (1 MARK)

Why would the experimenter have included the week one condition?

.....

Question 8 (2 MARKS)

Identify and describe a different measure that the experimenter could have used instead of sleep diaries.

.....

Question 9 (3 MARKS)

Explain how blue light blocking at night-time influences the suprachiasmatic nucleus (SCN) and how it affects sleep.

.....

Question 10 (2 MARKS)

Suggest an alternative influence on sleep that could replace blue light blocking glasses in this experiment and explain why it would be useful to test in an experiment.

.....

Question 11 (3 MARKS)

The caffeine consumption of the participants was controlled by the experimenter for the three-week period. Why was this decision necessary?

.....

Question 12 (3 MARKS)

Participants were required to state whether they knew any information about glasses designed to improve sleep before partaking in the experiment. If they answered yes, they were excluded from the experiment. With reference to extraneous variables, suggest why the experimenter would have done this.

.....

Question 13 (4 MARKS)

Consider the participants who rated their sleep as poor.

- a. What impact may this have on their affective functioning? (2 MARKS)
 - b. How would the impact on their cognitive functioning compare to people with a BAC of 0.05? (2 MARKS)
-

Question 14 (3 MARKS)

What is a placebo and did the placebo effect occur in this experiment?

.....

Question 15 (2 MARKS)

What may be an issue with rating sleep quality on a scale from 1-10?

UNIT 4 AOS 2

What influences mental wellbeing?

In this area of study students explore mental wellbeing in terms of social and emotional wellbeing, levels of functioning, and resilience to cope with and manage change and uncertainty. Students investigate the concept of mental wellbeing as a continuum, recognising that an individual's mental wellbeing is influenced by the interaction of internal and external factors and fluctuates over time. They recognise that for Aboriginal and Torres Strait Islander people mental wellbeing is one element of a multidimensional and holistic view of wellbeing. Students apply a biopsychosocial approach to consider how biological, psychological and social factors are involved in the development and management of a specific phobia. Students explore protective factors that contribute to an individual's mental wellbeing from a biopsychosocial perspective and the importance of cultural determinants to the wellbeing of Aboriginal and Torres Strait Islander peoples.

Outcome 2

On completion of this unit the student should be able to discuss the concept of mental wellbeing, apply a biopsychosocial approach to explain the development and management of specific phobia, and discuss protective factors that contribute to the maintenance of mental wellbeing.

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8



CHAPTER 8

Defining mental wellbeing

LESSONS

- 8A** Ways of considering mental wellbeing
- 8B** Mental wellbeing as a continuum

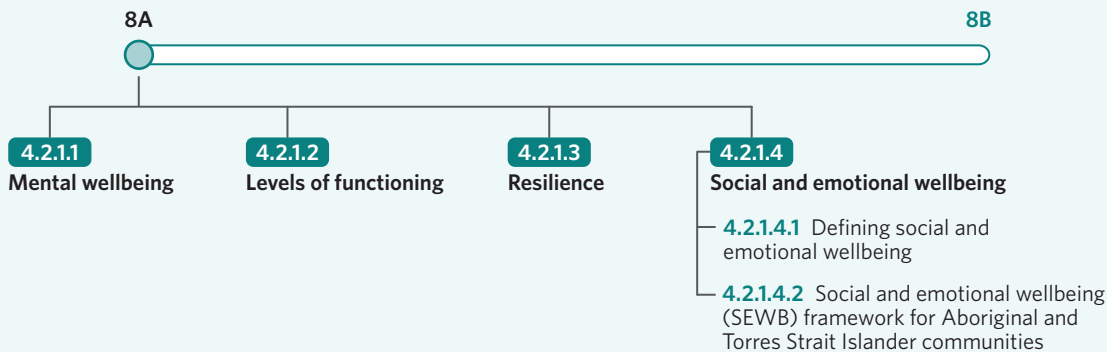
KEY KNOWLEDGE

- ways of considering mental wellbeing, including levels of functioning; resilience, as the ability to cope with and manage change and uncertainty; and social and emotional wellbeing (SEWB), as a multidimensional and holistic framework for wellbeing that encapsulates all elements of being (body, mind and emotions, family and kinship, community, culture, country, spirituality and ancestors) for Aboriginal and Torres Strait Islander people
- mental wellbeing as a continuum, with an individual's mental wellbeing influenced by the interaction of internal and external factors and fluctuating over time, as illustrated by variations for individuals experiencing stress, anxiety and phobia

8A Ways of considering mental wellbeing

STUDY DESIGN DOT POINT

- ways of considering mental wellbeing, including levels of functioning; resilience, as the ability to cope with and manage change and uncertainty; and social and emotional wellbeing (SEWB), as a multidimensional and holistic framework for wellbeing that encapsulates all elements of being (body, mind and emotions, family and kinship, community, culture, country, spirituality and ancestors) for Aboriginal and Torres Strait Islander people



We have all heard the term ‘wellbeing’ before, but what does it actually mean? Chances are each person you ask may have a slightly different understanding of what wellbeing entails. In this lesson, we will explore ways of considering mental wellbeing for individuals, including levels of functioning and resilience. We will also learn about the social and emotional wellbeing (SEWB) framework, which enables us to better understand how Aboriginal and Torres Strait Islander peoples can experience wellbeing.

Mental wellbeing 4.2.1.1

Mental wellbeing is a complex and multifaceted phenomenon. In this section of the lesson, you will learn about different aspects of wellbeing, including levels of functioning, resilience, and social and emotional wellbeing.

Theory details

In psychology, **wellbeing** refers to a state in which an individual is mentally, physically, and socially healthy and secure. More specifically, **mental wellbeing** is an individual’s current state of mind, including their ability to think, process information, and regulate emotions. Someone can be considered to have high or low levels of mental wellbeing depending on their ability to function and cope with everyday demands, their mood patterns, and the quality of their social connections.

In the following sections of the lesson, you will learn about three different ways of considering, or understanding, mental wellbeing, which are outlined in figure 1.

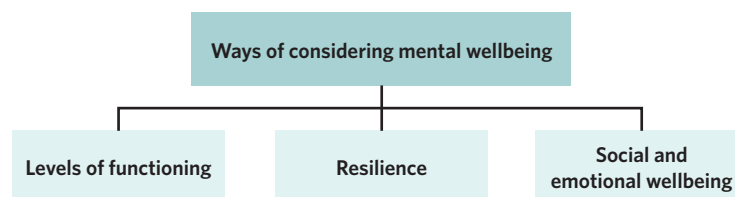


Figure 1 Ways of considering mental wellbeing

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Wellbeing a state in which an individual is mentally, physically, and socially healthy and secure

Mental wellbeing an individual’s psychological state, including their ability to think, process information, and regulate emotions

Levels of functioning 4.2.1.2

For a person to maintain high levels of mental wellbeing, they must be able to effectively meet the demands of everyday life. This ability is referred to as levels of functioning, and will be explored in more detail in this section of the lesson.

Theory details

In the context of mental wellbeing, **levels of functioning** refer to the degree to which an individual can complete day-to-day tasks in an independent and effective manner. Some characteristics of high and low levels of functioning are explored in table 1.

Table 1 Some characteristics of high and low levels of functioning

| High levels of functioning | Low levels of functioning |
|---|---|
| <p>Individuals with high levels of functioning may:</p> <ul style="list-style-type: none"> carry out basic everyday tasks, such as maintaining personal hygiene and dressing appropriately be productive in completing daily tasks set goals and take steps towards achieving them be independent adapt to changes in the environment. | <p>Individuals with low levels of functioning may:</p> <ul style="list-style-type: none"> struggle to carry out basic tasks, such as maintaining personal hygiene and dressing appropriately feel uncharacteristically lethargic or tired and thus be unproductive in achieving tasks lack direction or be able to set goals in life be unable to cope with changes in the environment. |

Levels of functioning the degree to which an individual can complete day-to-day tasks in an independent and effective manner

It is important to note that to 'be independent' in the above list is only relevant if you are physically and developmentally capable of doing so. Someone with a disability may require assistance to complete some day-to-day tasks, but that does not mean that they do not have high levels of mental wellbeing. They are still able to successfully meet the demands of their daily life and flourish while doing so. It is only when an individual cannot successfully meet the demands of their everyday life that they are not achieving a high level of functioning. For example, a person who is unable to get themselves ready in the morning because they don't want to go to work maybe said to have low levels of functioning. Low levels of functioning may lead to a sense of hopelessness, reducing an individual's self-belief and, in turn, mental wellbeing.

An individual's level of functioning is an important indicator of overall mental wellbeing. Being able to effectively engage with day-to-day tasks, such as preparing food and dressing oneself appropriately, prevents people from becoming easily overwhelmed and increases an individual's sense of capability and control in their lives. If an individual is consistently unable to adequately engage with the demands of daily life, it can be a sign that they are experiencing overall low levels of mental wellbeing.

Resilience 4.2.1.3

In addition to being able to function effectively and independently, coping and adapting to ever-changing life circumstances is vital to maintaining overall mental wellbeing. This is known as resilience, and will be explored in detail during this section of the lesson.

Theory details

It is inevitable for stress to occur in everyday life. **Resilience** refers to the ability to cope with and manage change and uncertainty. In turn, resilience enables a person to overcome these stressors and recover from the challenges presented. Table 2 explores characteristics of high and low levels of resilience.

Resilience the ability to cope with and manage change and uncertainty

Table 2 Some characteristics of high and low levels of resilience

| High levels of resilience | Low levels of resilience |
|---|--|
| <p>Individuals with high levels of resilience may:</p> <ul style="list-style-type: none"> seek solutions to problems use appropriate coping strategies be flexible in changing circumstances be optimistic and hopeful. | <p>Individuals with low levels of resilience may:</p> <ul style="list-style-type: none"> experience enduring feelings of being overwhelmed when problems arise rely on unhealthy or unhelpful coping strategies be unable to adapt to change lack hope and optimism. |

LESSON LINK

In lesson **3E Coping with stress**, you learnt about the concepts of 'coping flexibility' and 'context-specific effectiveness'. Having high levels of coping flexibility leads to context-specific effectiveness, which can support resilience as it enables you to adapt to unique stressors more effectively. Feeling confident in your ability to cope in turn supports your ability to manage change and uncertainty.

Social wellbeing

the ability for an individual to form and maintain meaningful bonds with others, and adapt to different social situations

Emotional wellbeing

the ability for an individual to appropriately control and express their own emotions in an adaptive way, as well as understand the emotions of others

A high level of resilience is a feature of an overall positive state of mental wellbeing because it can be a result of, or lead to, an individual having:

- high self-esteem
- more confidence in carrying out tasks
- increased coping flexibility, which enables them to adjust coping strategies to a range of stressors.

Being resilient does not mean that your life is without difficulty or distress, or that you are always happy. Rather, high levels of resilience lead to mental wellbeing as you are able to respond effectively to stressors, overcome them, or adapt to them. Interestingly, resilience is something that can be taught and developed over time (Joyce et al., 2018), and often results from seeking appropriate social support in times of stress.

Social and emotional wellbeing 4.2.1.4

Social and emotional wellbeing are aspects of overall mental wellbeing that are deeply linked to one another, and that are understood differently in different communities. In this section of the lesson, you will explore what social and emotional wellbeing looks like and learn about the social and emotional wellbeing (SEWB) framework in order to understand how social and emotional wellbeing can be understood in Aboriginal and Torres Strait Islander communities.

Theory details

For a person to maintain optimal mental wellbeing, achieving social and emotional wellbeing is important. **Social wellbeing** involves the ability for an individual to form and maintain meaningful bonds with others, and adapt to different social situations, while **emotional wellbeing** involves the ability for an individual to appropriately control and express their own emotions in an adaptive way, as well as understand the emotions of others. Having both strong social and emotional wellbeing enables individuals to navigate many situations in their everyday life, and is therefore an important characteristic of mental wellbeing.

Defining social and emotional wellbeing 4.2.1.4.1

Social wellbeing

A person with optimal social wellbeing is able to develop a sense of connection to others. Social wellbeing is important, as interacting with others is essential in most environments, such as at school and at home. Strong social wellbeing helps individuals to gain confidence and create positive interactions in a social setting. It also enables them to build strong support networks, which leads to overall better mental wellbeing. Some examples of high and low levels of social wellbeing are explored in table 3.

Table 3 Some characteristics of high and low levels of social wellbeing

| High levels of social wellbeing | Low levels of social wellbeing |
|---|--|
| <p>A person with high levels of social wellbeing may:</p> <ul style="list-style-type: none"> • have a strong support network • be able to form and maintain meaningful relationships • be able to effectively communicate with others. | <p>A person with low levels of social wellbeing may:</p> <ul style="list-style-type: none"> • be isolated or lack support from others • have difficulty forming and maintaining meaningful relationships • struggle to effectively communicate with others. |

Emotional wellbeing

A person with high levels of emotional wellbeing can regulate their own emotions well, expressing positive and negative emotions at suitable times. They can also display empathy and effectively understand and respond to other people's emotions. Individuals with strong emotional wellbeing still experience negative emotions as they are an inevitable part of life. However, they can still be considered to have high levels of emotional wellbeing, and thus mental wellbeing, if they are able to effectively manage these emotions and appropriately express them. Examples of high and low levels of emotional wellbeing are explored in table 4.

Table 4 Some characteristics of high and low levels of emotional wellbeing

| High levels of emotional wellbeing | Low levels of emotional wellbeing |
|---|--|
| <p>A person with high levels of emotional wellbeing may:</p> <ul style="list-style-type: none"> • be aware of their own and others' current emotional state • experience a wide range of emotions • express emotions at appropriate times. | <p>A person with low levels of emotional wellbeing may:</p> <ul style="list-style-type: none"> • be unable to understand or name their own and others' emotions • feel numb or be unable to experience certain emotions • express emotions inappropriately or at inappropriate times (for example, yelling at your boss while at work). |

Although social wellbeing and emotional wellbeing are distinct concepts, they are often explored together as they are deeply interrelated. Our ability to understand and label our own emotions enables us to communicate our needs to others, thus strengthening our relationships and ability to seek support. Likewise, being able to empathise with others and understand their emotional state leads to the formation of meaningful relationships, and by extension high levels of social wellbeing. Together, these are important facets of overall mental wellbeing.

Social and emotional wellbeing (SEWB) framework for Aboriginal and Torres Strait Islander communities 4.2.1.4.2

Aboriginal peoples and communities have long known and taught the importance of considering the whole person when conceptualising mental wellbeing. Therefore, one approach that has been developed to understand mental wellbeing is **social and emotional wellbeing (SEWB)**, which is a framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples. Importantly, the SEWB framework is:

- **multidimensional**, meaning that it is made up of different components.
- **holistic**, which reflects an approach to wellbeing that considers the whole person, including their mental, physical, spiritual, and social needs.

PSYCHOLOGY EXPLORATION

Today, contemporary Western views of wellbeing are similarly holistic and multidimensional, taking into account biological, psychological, and social factors that impact mental wellbeing. Treatments for mental health disorders will also often involve elements that address all three of these domains, such as medication (biological), therapy (psychological), and community support (social). But this was not always the case!

Prior to the 1970s, the medical model of mental health was predominant in Western psychological sciences. This model viewed mental health much like physical health, and sought to treat mental health issues through extreme biological interventions. Subsequently, the biopsychosocial model was established by George Engel in 1977 to counter this popular view. He believed that the consideration of biological, psychological, and social factors, and their interactions with one another, was imperative when working with patients. Therefore this model works to explain how the interaction of these factors influences overall health, wellbeing, and development. You will learn more about the biopsychosocial model of mental wellbeing later in this course.

This framework illustrates that wellbeing is grounded in a collectivist perspective, which means that the self is viewed as significantly linked to family and community (Gee et al., 2014). This framework also illustrates that culture and cultural identity are integral to achieving social and emotional wellbeing.

Before you begin to learn about the SEWB framework, it is important to understand that there is immense cultural and linguistic diversity between Aboriginal and Torres Strait Islander communities, leading to different understandings of social and emotional wellbeing between cultural groups and individuals (Gee et al., 2014). Broadly speaking, however, wellbeing is considered to be a holistic concept which results from a connection between individuals, family, community, land, culture, spirituality, and ancestry.

The SEWB framework is outlined in figure 2.

USEFUL TIP

The ways of considering mental wellbeing explored in this lesson are complex and cannot be assessed in isolation. For example, an individual needs high levels of functioning in order to be able to effectively communicate with others (e.g. when making social arrangements) and adapt to changing circumstances, which are also aspects of resilience and social and emotional wellbeing. In the exam, scenarios can cover all of these, as these concepts are interrelated. For example, question 5 in the VCAA Psychology exam 2015 required students to draw on multiple indicators of mental wellbeing to analyse a given scenario. Therefore, it is important to think about the multiple ways of considering mental wellbeing that may be relevant to the question being asked.

Social and emotional wellbeing (SEWB)

a framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples

Multidimensional made up of different components

Holistic (in relation to SEWB) an approach to wellbeing that considers the whole person, including their mental, physical, spiritual, and social needs



Image: © Gee, Dudgeon, Schultz, Hart and Kelly, 2013

Figure 2 The Social and Emotional Wellbeing Framework (Australian Government, 2017)

This framework explores seven dimensions, or sources, of wellbeing that enable a strong and positive Aboriginal or Torres Strait Islander identity. These dimensions, although separated in the framework, are all interconnected. Each dimension of this framework is detailed in table 5.

Table 5 Dimensions of the social and emotional wellbeing (SEWB) framework

| Dimension | Description | Examples |
|---|--|--|
| Connection to Body | Connecting to the physical body and health in order to participate fully in all aspects of life. | <ul style="list-style-type: none"> • Maintaining a healthy weight. • Access to good nutrition. • Managing illness and disability. |
| Connection to Mind and Emotions | Ability to effectively manage thoughts and feelings. | <ul style="list-style-type: none"> • Maintaining self-esteem. • Connecting to values and motivation. • Having high levels of confidence. • Maintaining a strong identity. |
| Connection to Family and Kinship | Connection to the immediate and wider family group and community. | <ul style="list-style-type: none"> • Spending time within family groups promotes a feeling of connection and therefore wellbeing. • Caring for the ill is the responsibility of all, not simply one’s biological parents or children. |
| Connection to Community | Connection to wider social systems, providing individuals and families the ability to connect with and support each other. | <ul style="list-style-type: none"> • Community services and support networks. • The ability to maintain community connections plays an integral role in maintaining the wellbeing of individuals (Dudgeon et al., 2015). |
| Connection to Culture | A strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs. | <ul style="list-style-type: none"> • Elders passing on information and tradition to future generations. • Speaking local languages. • Attending cultural events. • Participating in traditional rites and rituals, which enable children to learn about their culture’s value systems, including those related to wellbeing. |

Continues ►

Body (in relation to SEWB) connecting to the physical body and health in order to participate fully in all aspects of life

Mind and Emotions (in relation to SEWB) ability to effectively manage thoughts and feelings

Family and Kinship (in relation to SEWB) connection to the immediate and wider family group and community

Community (in relation to SEWB) connection to wider social systems, providing individuals and families the ability to connect with and support each other

Culture (in relation to SEWB) a strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs

Table 5 Continued

| Dimension | Description | Examples |
|--|--|--|
| Connection to Country | The traditional lands of a particular language or cultural group, both geographically and the spiritual, emotional, and intellectual connections to and within it. | <ul style="list-style-type: none"> Aboriginal and Torres Strait Islander beliefs are tied heavily to the land and how one lives on it. One should and does not take more than one needs so the land continues to thrive. Each person belongs to certain territories within family and clan groups, and by extension has spiritual connections and obligations to the associated land. Therefore, one belongs to the land rather than the other way around (Dudgeon et al., 2014). Connection to Country is a strong part of Aboriginal culture and therefore a strong part of establishing social and emotional wellbeing (Deadly Story, n.d.). |
| Connection to Spirituality and Ancestors | <p>Spirituality refers to a concept that connects all things, and shapes beliefs, values, and behaviour. It guides knowledge systems, culture, and all that is life for Aboriginal people, including connections to ancestors, the past, the present, and the future.</p> <p>Ancestors refer to a belief that a family and community's ancestors are interconnected with Creation spirits and Country and watch over, guide, and protect families and communities in the physical and spiritual world.</p> | <ul style="list-style-type: none"> Aboriginal and Torres Strait Islander peoples' spirituality is grounded in the belief that their ancestors watch over them for the entirety of their life. There is a strong belief that ancestors will offer guidance when needed and answer questions in unique ways when least expected. This creates a sense of purpose and wellbeing (Deadly Story, n.d.). |

Country (in relation to Aboriginal and Torres Strait Islander cultures) traditional lands of a particular language or cultural group, including both geographical boundaries and the spiritual, emotional, and intellectual connections to and within it

Spirituality (in relation to SEWB) a concept that connects all things, and shapes beliefs, values, and behaviour. It guides knowledge systems, culture, and all that is life for Aboriginal people, including connections to ancestors, the past, the present, and the future

Ancestors (in relation to SEWB) a belief that a family and community's ancestors are interconnected with Creation spirits and Country and watch over, guide, and protect families and communities in the physical and spiritual world

This framework also acknowledges that all aspects of social and emotional wellbeing for Aboriginal and Torres Strait Islander peoples are impacted by social, historical, and political determinants of wellbeing. These determinants circle the dimensions of wellbeing within the SEWB framework, which signifies that the experience of wellbeing in Aboriginal and Torres Strait Islander communities is impacted by wider societal forces. As with all influences on wellbeing, these three categories are interrelated and, at times, are hard to separate. These determinants of wellbeing are explained in table 6.

Table 6 Determinants of wellbeing for Aboriginal and Torres Strait Islander peoples (Dudgeon et al., 2015)

| Determinant | Explanation | Examples |
|-------------------------|---|---|
| Social determinants | The circumstances in which people grow, live, and work, and the systems put in place to deal with illness (WHO, 2008). | <ul style="list-style-type: none"> Socioeconomic status (level of wealth) The impact of poverty Unemployment Racial discrimination |
| Historical determinants | The ongoing influence of events, policies, and trauma on groups of people (AHRC, 2007). | <ul style="list-style-type: none"> Colonisation and its legacy (for example, the ongoing loss of culture and language) The impact of past government policies (for example, policies of Aboriginal child removal) |
| Political determinants | Political policies that shape the process of distributing resources and power to individuals and communities, and create or reinforce social and health inequalities (Dawes, 2020). | <ul style="list-style-type: none"> Unresolved issues of land Control of local resources The rights of self-determination and sovereignty (individuals and communities making their own choices and managing their own lives in culturally informed ways) |

WANT TO KNOW MORE?

The National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing is where the SEWB framework is explored in depth. This framework is an Australian Government report which is revised and republished regularly. It provides a dedicated focus on Aboriginal and Torres Strait Islander health and wellbeing, specifically the SEWB. To read the 2017-2023 (most recent) version of the framework, type the URL niaa.gov.au/sites/default/files/publications/mhsewb-framework_0.pdf into your browser.

(Commonwealth of Australia, 2017)

Overall, for Aboriginal and Torres Strait Islander peoples, SEWB is a complex concept of wellbeing that extends beyond conventional understandings. Although mental wellbeing is an important dimension of SEWB, this framework demonstrates that it is only one component of overall wellbeing that is influenced by social, emotional, physical, cultural, and spiritual expressions of wellbeing (Gee et al. 2014).

PSYCHOLOGY EXPLORATION

A model in scientific research is a representation of ideas. A lot of research and analysis goes into creating a model, like the SEWB model you have explored in this lesson. Another example of such research was conducted by Schultz et al. (2019, p.1), who set out to explore 'wellbeing for Indigenous Australians in remote regions, through defining and quantifying Indigenous people's values and priorities'. Acknowledging that many Australian health care services fail to recognise the unique aspects of Aboriginal and Torres Strait Islander cultures and communities, they worked with Indigenous communities in Western Australia and the Northern Territory to create a framework of wellbeing priorities, which included community, culture, and empowerment. Such projects reinforce the importance of cultural relevance in psychology research, and working directly with different communities in order to develop a true understanding of their experiences, rather than misapplying existing models that may not be relevant in their context.

Theory summary

In this lesson, you have learnt about ways of considering wellbeing for an individual, including high levels of functioning, resilience, and social and emotional wellbeing. You have also learnt about the SEWB framework as a way of understanding wellbeing for Aboriginal and Torres Strait Islander peoples.

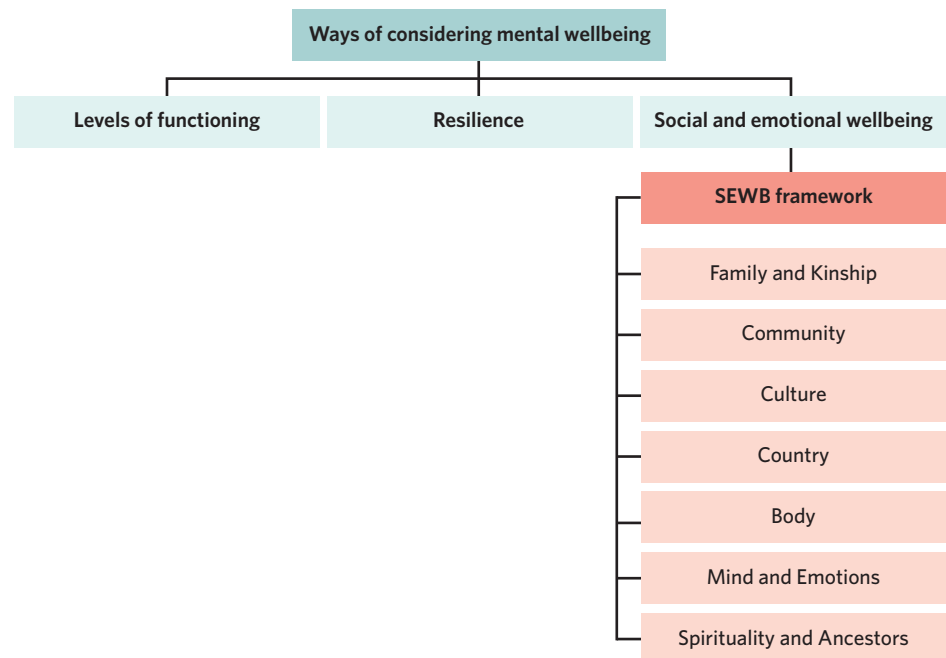


Figure 3 Summary of lesson 8A

8A Questions

Theory review

Question 1

Optimal mental wellbeing includes **(Select all that apply)**

- I. high levels of functioning.
- II. resilience.
- III. social connections.
- IV. emotional regulation.
- V. keeping busy.

Question 2

High levels of functioning involve people being able to complete everyday tasks in an independent and _____ manner.

Which of the following best fills in the blank?

- A. effective
- B. fast

Question 3

Having resilience means that you do not experience stress.

- A. True.
- B. False.

Question 4

The social and emotional wellbeing (SEWB) framework explains wellbeing from a holistic perspective.

- A. True.
- B. False.

Question 5

Which of the following are included in the SEWB framework? **(Select all that apply)**

- I. Body.
- II. Mind and emotions.
- III. Family and kinship.
- IV. Community.
- V. Access to services.
- VI. Culture.
- VII. Country.
- VIII. Spirituality and ancestors.

Assessment skills

Perfect your phrasing

Question 6

Which of the following is most correct?

- A. Resilience refers to the ability to manage change and **uncertainty**.
- B. Resilience refers to the ability to manage change and **difficulty**.

Question 7

Which of the following is most correct?

- A. People with good mental wellbeing demonstrate **high levels of functioning**, which refers to the ability to complete day-to-day tasks **effectively**.
- B. People with good mental wellbeing **can function**, which refers to the ability to complete day-to-day tasks **well**.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

The relationship between resilience and coping is that

- A. coping can be learnt whereas resilience is a quality you are born with.
- B. resilience means that an individual does not need to use coping skills.
- C. coping skills can increase an individual's resilience in the face of stress.
- D. All of the above.

Question 9

The social and emotional wellbeing (SEWB) framework is unique when compared to other models of wellbeing (for example, Lazarus and Folkman's Transactional Model of Stress and Coping or Selye's General Adaptation Syndrome), because it

- A. focuses on the community rather than the individual.
- B. considers wellbeing from a holistic perspective, whereas other models focus on only one aspect of wellbeing (such as the physical or psychological experience of stress).
- C. considers treatments for mental health concerns.
- D. None of the above.

Exam-style

Remember and understand

Question 10 (1 MARK)

Which of the following best describes the characteristics of an individual displaying resilience?

- A. Low level of self-esteem, can perform daily tasks, and avoid stressors.
- B. Experiences lower levels of stress, is respectful of others, and cannot cope with the stressors they regularly face.
- C. Can return to the functioning state that occurred before the presence of a stressor, has high self-esteem, and adapts to many types of stressors.
- D. Enjoys seeing family and friends, feels hopeless when they cannot cope with stress, and has a high level of confidence.

Question 11 (1 MARK)

The ability to be independent and effectively meet everyday demands within the environment is known as

- A. confidence.
- B. resilience.
- C. being a grown up.
- D. high levels of functioning.

Question 12 (1 MARK)

Explain what is meant by the term 'holistic' in regards to the social and emotional wellbeing (SEWB) framework.

Question 13 (3 MARKS)

Using examples, explain a characteristic of mental wellbeing and why it is an important aspect of maintaining overall good wellbeing.

Apply and analyse**Question 14** (1 MARK)

After losing his job, Tom missed his work colleagues as well as his daily bike ride to work. He found it difficult to financially cope and had to move back in with his parents. Despite these challenges, he still maintained respectful relationships with his friends and family and kept in touch with his work colleagues. Two of his friends helped him move house and his mum encouraged him to start applying for new jobs.

Tom would be considered to have strong mental wellbeing due to

- A. displaying strong social wellbeing.
- B. missing his bike rides.
- C. having weak emotional wellbeing.
- D. finding it hard when losing his job.

Adapted from VCAA Psychology exam 2017 Q39

Question 15 (3 MARKS)

Outline three examples of what the social and emotional wellbeing (SEWB) framework suggests about Aboriginal and Torres Strait Islander peoples' perspectives of mental wellbeing.

Question 16 (4 MARKS)

Jimmy got into a car accident where his amygdala was damaged. After this accident, he found it difficult to fall asleep, did not want to see his friends or family anymore, found it hard to cook dinner for himself, and showed less respect for his colleagues at work.

Using examples from the scenario, explain why Jimmy is not displaying high levels of mental wellbeing after his accident, with reference to two characteristics of mental wellbeing.

Adapted from VCAA Psychology exam 2018 Q14

Evaluate**Question 17** (3 MARKS)

Referring to the social and emotional wellbeing (SEWB) framework and its dimensions, justify why considering and treating social and emotional concerns from a holistic perspective leads to better mental wellbeing for Aboriginal and Torres Strait Islander peoples.

Questions from multiple lessons

Use the following information to answer questions 18 and 19.

When Tina first left her home country in search of a better life and moved to Australia, she missed her family and found it hard to learn English. She felt as if she did not fit in with the people she met in Australia and spent most of her free time watching movies.

Two months after moving to Australia, she decided to sign up for an English class which helped her to get a job that she enjoyed. After receiving help from her work friends and her neighbours, she was able to use public transport, has learnt new meals to cook, and has joined a netball team.

Question 18 (1 MARK)

When Tina spent most of her free time watching movies, she was displaying

- A. coping-specific effectiveness.
- B. avoidance coping.
- C. strong emotional wellbeing.
- D. independence.

Question 19 (1 MARK)

Which of the following most accurately describes the characteristics of mental wellbeing that Tina displayed two months after moving to Australia?

| | Resilience | Social and emotional wellbeing | High levels of functioning |
|-----------|--|--|---|
| A. | Adapted to challenges in her environment | Regularly communicated with others in an effective manner | Independently completed tasks |
| B. | Immediately displayed flexibility to stressors | Had a strong support network | Unable to meet the demands of everyday life |
| C. | Solely focused on the cause of her stress | Was productive | Was sensitive to other people's emotions |
| D. | Forgot about her family | Regularly communicated with her friends and family back home | Was confident |

Question 20 (7 MARKS)

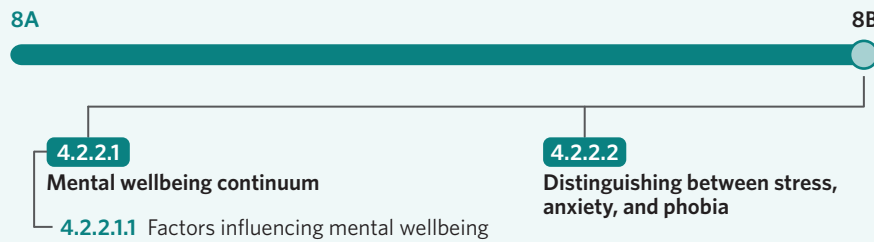
Ingrid is a new mother who is struggling with a lack of sleep since she gave birth to her daughter. She is starting to believe that she is incapable of looking after her daughter and has recently relied on eating pre-packaged food, even though she usually loves cooking. Her sister Jessica realises that Ingrid is struggling and offers to look after the baby so that she can sleep, but Ingrid is offended by this suggestion and responds that she is fine.

- Identify a stressor Ingrid is exposed to in the scenario and whether it is considered to be internal or external. (2 MARKS)
- According to Lazarus and Folkman's Transactional Model of Stress and Coping, outline how Ingrid is most likely interpreting the stressor during primary appraisal. Use an example to justify your response. (2 MARKS)
- Using examples, explain if Ingrid has positive or negative experiences of mental wellbeing in this scenario, with reference to at least two characteristics. (3 MARKS)

8B Mental wellbeing as a continuum

STUDY DESIGN DOT POINT

- mental wellbeing as a continuum, with an individual's mental wellbeing influenced by the interaction of internal and external factors and fluctuating over time, as illustrated by variations for individuals experiencing stress, anxiety and phobia



The lived experience of mental wellbeing is quite complex. In this lesson, you will learn about the continuum of mental wellbeing, and how our position on that continuum is never static and fluctuates over time. You will also learn about the experiences of stress, anxiety, and specific phobia as different lived examples of the mental wellbeing continuum.

Mental wellbeing continuum 4.2.2.1

In this section of the lesson, you will learn about the mental wellbeing continuum, and how internal and external factors impact mental wellbeing.

Theory details

An individual's **mental wellbeing** refers to their psychological state, including their ability to think, process information, and regulate emotions. Mental wellbeing changes over time depending on what an individual is experiencing in their lives. This leads to individuals being placed at different points on the mental wellbeing continuum over their lifetime.

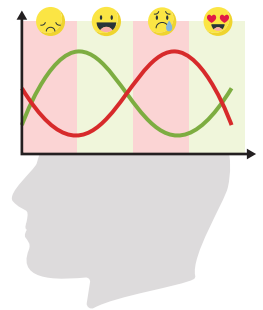
The **mental wellbeing continuum** refers to a tool used to track fluctuating mental wellbeing, ranging from high levels of mental wellbeing to low levels of mental wellbeing. Every individual is placed at different points of this continuum at certain times. The mental wellbeing continuum is reflected in figure 1, and the points of this continuum are outlined in table 1.



Figure 1 The mental wellbeing continuum ranges from high to low levels of mental wellbeing

As mental wellbeing is a dynamic (constantly changing) state, an individual's placement on the continuum is not fixed and can shift over time. This means that someone with a diagnosed mental health disorder, who may currently be placed at low levels of mental wellbeing on the continuum, may not always experience distress. If their condition is well managed and they have adequate support, they may move up the continuum to become categorised as having high levels of mental wellbeing.

Furthermore, high levels of mental wellbeing are characterised by optimal functioning in everyday life. As someone moves down the continuum to lower levels of mental wellbeing, their everyday functioning is disrupted.



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Mental wellbeing
an individual's psychological state, including their ability to think, process information, and regulate emotions

Mental wellbeing continuum
a tool used to track fluctuating mental wellbeing

LESSON LINK

In lesson **8A Ways of considering mental wellbeing**, you learnt that mental wellbeing can be considered from three perspectives:

- levels of functioning
- resilience
- levels of social and emotional wellbeing.

You can think of each of these aspects of mental wellbeing as varying along the continuum, depending on an individual's current circumstances. Even if somebody has low levels of one of these indicators of mental wellbeing at a point in their lives, it does not mean that this is permanent.

Table 1 The points of the mental wellbeing continuum

| Point on continuum | Characteristics | Example |
|--|--|---|
|  <p>High levels of mental wellbeing</p> | <p>A person with high levels of mental wellbeing is:</p> <ul style="list-style-type: none"> • able to function independently within their everyday life • able to cope with every day demands without showing an excessive level of distress and dysfunction • still may experience stress, sadness, and anger, however, have high levels of mental wellbeing due to their ability to cope with these experiences, regulate emotions, and express them appropriately. | <p>Mei Zhen is a healthy teenager who balances school, a job, and sporting commitments. Although she feels stressed when she has a lot of SACs, Mei Zhen has a strong study timetable and support system, and is able to cope with these stressors effectively.</p> |
|  <p>Middle of the continuum (neither extremely high nor low levels of mental wellbeing)</p> | <p>An individual with moderate levels of mental wellbeing:</p> <ul style="list-style-type: none"> • is not functioning at an optimal level • experiences a temporary or moderate impact on mental wellbeing • experiences amplified emotions and high levels of stress • has difficulty concentrating • is more likely to experience irrational thought patterns. <p>Compared to experiencing extremely low levels of mental wellbeing, the causes and impacts of being in the middle of the continuum tend to be less severe and more temporary in nature.</p> | <p>Mei Zhen is approaching year 12 exams and finds herself unable to sleep and crying often because of the intense stress. However, she seeks support from the school counsellor and, once her exams are over, she goes back to her normal cheerful self.</p> |
|  <p>Low levels of mental wellbeing</p> | <p>An individual with extremely low levels of mental wellbeing:</p> <ul style="list-style-type: none"> • shows high levels of distress • is unable to independently complete tasks and meet the demands of their environment • is impacted for an extended period of time (more than two weeks or in line with advice from mental health professionals) • may be diagnosed by a mental health professional and may be treated through psychotherapy or medication. | <p>When Mei Zhen finishes university, she experiences a number of significant life stressors and develops significant anxiety. She often has panic attacks and irrational thoughts, leading her to cancel plans with her friends and family. A psychologist diagnoses her with an anxiety disorder, and supports her with therapy and medication.</p> |

WANT TO KNOW MORE?

There are many ways to conceptualise the mental wellbeing continuum. For example, the Canadian Department of National Defense developed a particular Mental Health Continuum in the context of Canadian university students (Chen et al., 2020). On the continuum, mental wellbeing is categorised as ranging between:

- healthy
- reacting
- injured
- ill.

Continues ►

WANT TO KNOW MORE?

There are also other ways of conceptualising mental wellbeing as a continuum. In the previous VCE Psychology study design, the mental health continuum was divided into three sections:

- mentally healthy
- mental health problem
- mental health disorder.

This is depicted in figure 2.



Figure 2 The mental health continuum

Although these categories are different to the ones explored in this lesson, they reinforce the notion that mental wellbeing is not a binary notion (mentally well or mentally unwell), but rather a phenomenon that fluctuates over time and circumstance.

Factors influencing mental wellbeing 4.2.2.1.1

At any given time, a person's placement on the mental wellbeing continuum is influenced by both internal and external factors.

- **Internal factors** are factors that arise from within the individual.
- **External factors** are factors that arise from an individual's environment.

These factors interact to influence a person's mental wellbeing in two ways.

- They can contribute to the development or progression of low levels of mental wellbeing.
- They can protect an individual from the development or progression of low levels of wellbeing, instead maintaining high levels of mental wellbeing.

These types of factors are explored in detail in table 2. Please note that these are only some examples of these factors and this list is not exhaustive.

Table 2 The influence of internal and external factors on mental wellbeing

| | Internal Factors | External factors |
|---|---|---|
| Examples of the types of factors | <ul style="list-style-type: none"> • Stress response • Thought patterns • Genetic predisposition | <ul style="list-style-type: none"> • Loss of a significant relationship • Level of education • Experiencing difficulty within certain environments, such as at work or school • Access to support services, such as medical and psychological treatment |
| How can this maintain high levels of mental wellbeing? | If a person has naturally optimistic thought patterns, they may be more likely to view difficult situations positively and thus protect their mental wellbeing. | A person who has adequate access to support systems, like friends, family, or professional support, will have greater access to help when needed. This will help them maintain high levels of mental wellbeing, even in difficult circumstances. |
| How can this lead to low levels of mental wellbeing? | If a person has a genetic predisposition (family history) to a mental health disorder, they may be more likely to develop one than someone who does not have the same genetic predisposition, leading to a greater likelihood of having low levels of mental wellbeing. | The loss of a significant relationship can negatively impact mental wellbeing if not adequately addressed, which involves low levels of mental wellbeing. |

Continues ►

Internal factors factors that arise from within the individual

External factors factors that arise from an individual's environment

LESSON LINK

In **3A Stress**, you learnt about internal and external stressors that prompt the stress response. These stressors are the same internal and external factors that you can discuss in relation to overall mental wellbeing. Stress, particularly if it is ongoing, can impact where someone is placed on the mental wellbeing continuum, and it is important to consider the overlap between these two areas of study.

Table 2 Continued

| | Internal Factors | External factors |
|----------------|---|--|
| Example | <p>Mei Zhen is a generally positive person who views her assessments at school as an opportunity to learn and become a better student. This is what helped her maintain high levels of mental wellbeing in stressful times while at school.</p> <p>However, she has a family history (genetic predisposition) of anxiety disorders, and her mum has suffered from panic attacks at various times in her life. This may have contributed to her developing significant anxiety when she finished university, which resulted in low levels of mental wellbeing.</p> | <p>Mei Zhen had a strong external support system in her friends, family, and school, which helped her maintain high levels of mental wellbeing when she had a lot of SACs. When she experienced significant anxiety when she finished university, access to a psychologist helped her recovery, enabling her to maintain high levels of mental health and wellbeing.</p> |

Distinguishing between stress, anxiety, and phobia 4.2.2.2

In this section of the lesson, you will explore the experiences of stress, anxiety, and phobia as a way of distinguishing between different points on the mental wellbeing continuum.

Theory details

To illustrate the varied lived experience of different points on the mental wellbeing continuum, there are three psychological constructs that can be explored:

- stress
- anxiety
- specific phobia.

These psychological constructs have many similarities, and as such, it can be difficult to distinguish between them. However, there are important differences between them that demonstrate their different placements along the mental wellbeing continuum.

The differences between stress, anxiety, and specific phobia in relation to the mental wellbeing continuum are displayed in figure 3.

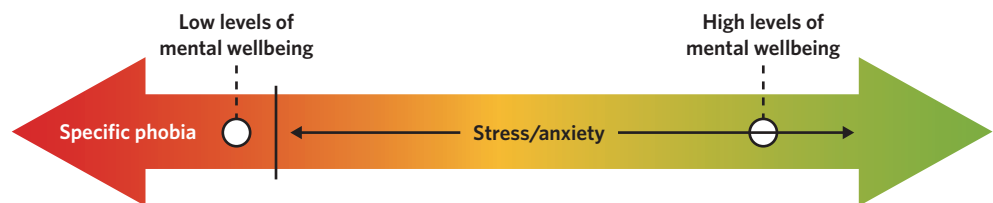


Figure 3 Stress, anxiety, and specific phobia on the mental wellbeing continuum

As explored in chapter 3, **stress** is a psychological and physiological experience that occurs when an individual encounters something of significance that demands their attention and/or efforts to cope. Importantly:

- stress is a normal part of life, and is not necessarily a sign of low levels of mental wellbeing.
- distress occurs, however, when an individual does not feel as though they have adequate resources to cope with a stressor. In these cases, it can lower an individual's level of mental wellbeing.
- stress is usually in response to a known cause, which differentiates it from anxiety.

Stress a psychological and physiological experience that occurs when an individual encounters something of significance that demands their attention and/or efforts to cope

Contrastingly, **anxiety** is a psychological and physiological response that involves feelings of worry and apprehension about a perceived threat. It can involve cautiousness regarding a potential threat, danger, or other negative events.

- While stress can involve both positive (eustress) and negative (distress) feelings, anxiety typically only involves negative feelings (distress).
- Anxiety is broader than stress and may be due to an unknown stimulus.
- Anxiety is usually future-oriented, meaning that it involves worrying about events that may happen in the future.

Both stress and anxiety are on the moderate to high part of the mental wellbeing continuum. They are similar because:

- people will experience both stress and anxiety from time to time, and it is an expected part of daily life.
- they usually don't interrupt daily functioning and are not always a sign of low mental wellbeing.
- some stress and anxiety can be adaptive for functioning as they can motivate people to take action, such as preparing for a SAC instead of avoiding it.

However, when anxiety is excessive, persistent over a long period of time, and disrupts aspects of daily functioning, an individual may experience lower levels of mental wellbeing. This may mean that at that particular point in time, the individual could be placed towards the 'low levels of mental wellbeing' side of the continuum.

In contrast to stress and anxiety, **specific phobia** is a type of diagnosable anxiety disorder that is categorised by excessive and disproportionate fear when encountering or anticipating the encounter of a particular stimulus (such as heights, spiders, or small spaces). Specific phobias are associated with:

- an individual going to great lengths to avoid their phobic stimulus
- significant disruption to an individual's daily functioning either at work, home, in their social life, or with family (American Psychiatric Association, 2013)
- low levels of mental wellbeing when encountering or attempting to avoid the phobic stimulus.

People who have a specific phobia are often aware that their level of fear and anxiety is disproportionate to the phobic stimulus, but are unable to control these feelings. This is due to the fact that the sympathetic nervous system is dominant when an individual is exposed to their phobic stimulus, which can result in physiological stress responses including:

- increased heart rate
- rapid breathing
- increased perspiration
- dilated pupils.

These characteristics of specific phobia are summarised in figure 4.

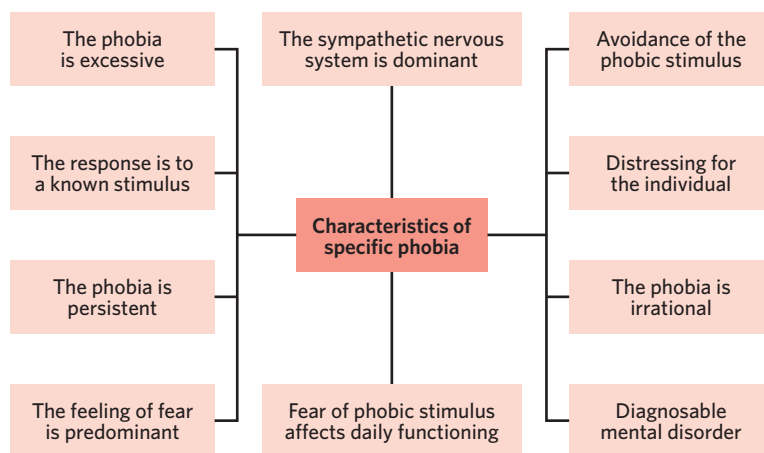


Figure 4 Some characteristics of specific phobia

USEFUL TIP

It can be difficult to differentiate between 'anxiety' as an emotion and 'anxiety disorders' as a diagnosed mental health condition. It is important to remember that everybody feels some levels of anxiety in their lives, and that this is a distinct experience from someone with a diagnosed anxiety disorder. Within this lesson, 'anxiety' is referred to in terms of the emotion ('feeling anxious'), rather than in terms of a diagnosed anxiety disorder.

Anxiety a psychological and physiological response that involves feelings of worry and apprehension about a perceived threat

Specific phobia a type of diagnosable anxiety disorder that is categorised by excessive and disproportionate fear when encountering or anticipating the encounter of a particular stimulus

WANT TO KNOW MORE?

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (American Psychiatric Association, 2013) recognises several different types of phobias. See table 3 for examples of phobias you may not know existed.

Table 3 Examples of specific phobias

| Specific phobia | Phobic stimulus |
|--------------------|-------------------|
| Acrophobia | Heights |
| Aerophobia | Flying |
| Arachnophobia | Spiders |
| Claustrophobia | Enclosed spaces |
| Hematophobia | Blood |
| Omphalophobia | Belly buttons |
| Sesquipedalophobia | Long words |
| Siderophobia | Stars |
| Xanthophobia | The colour yellow |

To further your understanding, the key psychological and biological differences between stress, anxiety, and specific phobia are outlined in table 4.

Table 4 Summary of key similarities and differences between stress, phobia, and anxiety

| | Stress | Anxiety | Specific phobia |
|--|--|---|---|
| Role of nervous system | The sympathetic nervous system becomes dominant | The sympathetic nervous system becomes dominant | The sympathetic nervous system becomes dominant |
| Type of stimulus | The response is to a known stimulus | The response might be to an unknown stimulus | The response is to a known stimulus |
| Associated emotions | Feelings can be either positive (excitement) or negative (apprehension, nervousness) | Feelings of apprehension, unease, and worry | The feeling of fear is disproportionate and excessive |
| Eustress or distress? | Can be either eustress (positive) or distress (negative) | Distress only | Distress only |
| Adaptive or maladaptive? | Some stress can be adaptive in the short term, but becomes maladaptive when it is persistent and impairs functioning | Some anxiety can be adaptive in the short term, but becomes maladaptive when it is persistent and impairs functioning | Phobia is always maladaptive |
| Place on mental wellbeing continuum | Fluctuates between low to high levels of mental wellbeing, depending on the severity and length of time | Fluctuates between low to high levels of mental wellbeing, depending on the severity and length of time | Associated with low levels of mental wellbeing |

Theory summary

In this lesson, you have learnt about mental wellbeing as a continuum that fluctuates over time in response to internal and external factors. The mental wellbeing continuum ranges from high to low levels of mental wellbeing.

You have also learnt about the variations between stress, anxiety, and specific phobia as a means of illustrating the different points of the wellbeing continuum. These conditions are summarised in table 5. Figure 5 depicts a visual summary of the lesson.

Table 5 Summary of stress, anxiety, and specific phobia

| | Details | Place on mental wellbeing continuum |
|------------------------|--|---|
| Stress | Results from encountering something of significance that demands attention or efforts to cope (usually known cause). | Fluctuates between medium to high levels of mental wellbeing, depending on the severity and length of time. |
| Anxiety | Involves feelings of worry and apprehension (not always known cause) and is usually future oriented. | Fluctuates between medium to high levels of mental wellbeing, depending on the severity and length of time. |
| Specific phobia | A type of anxiety disorder that is categorised by excessive and disproportionate fear when encountering a particular stimulus. | Typically associated with low levels of mental wellbeing. |

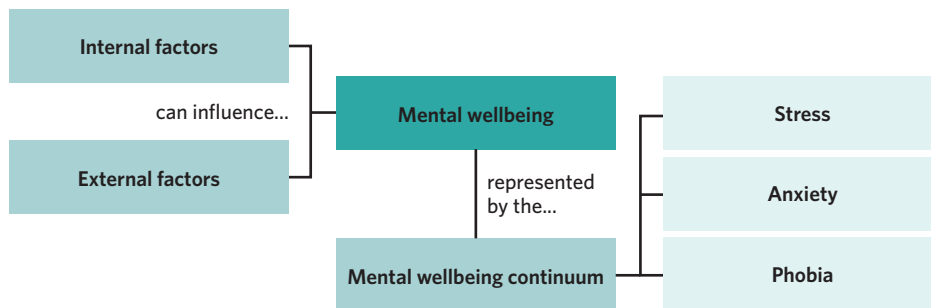


Figure 5 Summary of lesson 8B

8B Questions

Theory review

Question 1

People will move up and down the mental wellbeing continuum over time.

- A. True.
- B. False.

Question 2

Mental wellbeing is influenced by _____.

Which of the following best fills in the blank?

- A. internal and external factors
- B. psychological and biological factors

Question 3

Stress, anxiety, and specific phobia are placed at different points on the mental wellbeing continuum.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 4

Which of the following is most correct?

- A. Anxiety differs from stress as it is usually **future-oriented** and results from a potentially **unknown stimulus**.
- B. Anxiety differs from stress as it is usually **based on something in the future** and results from **something unknown**.

Question 5

Which of the following is most correct?

- A. Specific phobia refers to a type of anxiety disorder that is categorised by **extreme** fear when encountering a particular stimulus.
- B. Specific phobia refers to a type of anxiety disorder that is categorised by **excessive and disproportionate** fear when encountering or anticipating the encounter a particular stimulus.

Data analysis

The following assessment skills type reflects the study design assessment type:

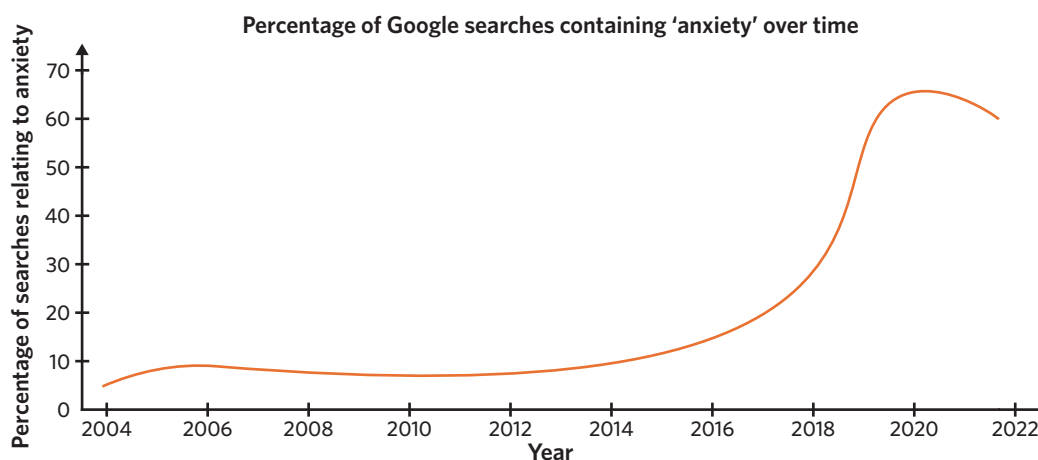
- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 6–8.

Dr. Vranes was reading a research paper about the increasing number of diagnosed anxiety disorders and began to think about how many people may be experiencing increases in daily stress and anxiety without receiving a formal diagnosis.

She hypothesised that, over the last 20 years, rates of anxiety had increased. To test her theory, she analysed the number of internet searches within Australia that had contained keywords relating to anxiety, calculating the percentage of these compared to the total number of internet searches made that year.

Her results are displayed in the graph.



Question 6

During what year was there the highest percentage of Google searches relating to anxiety?

- A. 2008.
- B. 2016.
- C. 2018.
- D. 2020.

Question 7

Between which years was there the greatest increase in the percentage of Google searches containing the word 'anxiety'?

- A. 2006–2008.
- B. 2008–2010.
- C. 2018–2020.
- D. 2020–2022.

Question 8

Dr. Vranes concluded that due to the increasing number of internet searches relating to anxiety, the prevalence of anxiety in Australia must also be increasing.

Is this conclusion justified?

- A. Yes, as the number of internet searches relating to anxiety is a valid measure of the overall number of anxiety cases.
- B. No, as the number of internet searches relating to anxiety is not a valid measure of the overall number of anxiety cases.
- C. Yes, as the number of internet searches relating to anxiety within Australia is generalisable to other populations.
- D. No, as the number of internet searches relating to anxiety within Australia is not generalisable to other populations.

Exam-style**Remember and understand****Question 9** (1 MARK)

Which of the following best describes the mental wellbeing continuum?

- A. A classification system which diagnoses mental health disorders.
- B. A categorical approach used to classify mental illnesses.
- C. A tool which tracks the progression of fluctuations in mental wellbeing.
- D. A tool which permanently assigns an individual as mentally healthy, having mental problems or having a mental disorder.

Question 10 (1 MARK)

Which of the following statements is correct?

- A. Stress can be an adaptive response to a stimulus, whereas phobia is maladaptive.
- B. Stress can be an adaptive response to a stimulus, whereas anxiety is always maladaptive.
- C. Phobia is an adaptive response to a stimulus, whereas stress is maladaptive.
- D. Phobia is an adaptive response to a stimulus, whereas anxiety is always maladaptive.

Question 11 (1 MARK)

Outline one difference between stress and anxiety.

Question 12 (4 MARKS)

Explain the difference between internal and external factors that influence mental wellbeing, giving an example for each.

Apply and analyse

Use the following information to answer questions 13 and 14.

Rohan has always been an extremely confident and outgoing guy who loves to spend time with his family and friends. However, when his uncle died two weeks ago, he began to spend more time in his room, refusing to see his friends or family anymore. Rohan used to go on skiing trips with his uncle during the winter, but he now refuses to even look at skis. He has also been finding it hard to sleep, sometimes only managing to sleep 3 hours a night.

Adapted from VCAA Psychology exam 2014 Q10

Question 13 (1 MARK)

The death of Rohan's uncle is an example of a/an

- A. daily hassle.
- B. external factor.
- C. catastrophe.
- D. internal factor.

Question 14 (1 MARK)

Which of the following is the most accurate description of Rohan's situation?

- A. Rohan has a mental health disorder because he should not care about his uncle's death.
- B. Rohan has high levels of mental wellbeing as teenagers are meant to spend lots of time alone in their rooms and this is a normal reaction to the death of a loved one.
- C. Rohan is experiencing reduced mental wellbeing as he is unable to function effectively.
- D. Rohan's mental health following the death of his uncle is only being impacted by external factors.

Question 15 (2 MARKS)

Renata has not been feeling like herself recently. Her mood is often down, and she feels uneasy thinking about her school year ahead. She often feels worried about school, but when her parents ask her why, she is unable to tell them what exactly she is worried about. Her parents decide to take her to a psychologist to seek support for her.

Is the psychologist likely to say that Renata is experiencing stress, anxiety, or phobia? Justify your response.

Questions from multiple lessons

Use the following information to answer questions 16 and 17.

Despina's mother recently passed away after being ill for a long time. She has taken some time off work to organise the funeral and is attempting to grieve while also being there for her kids. Despite these challenges, Despina has a strong support network of family and friends, and has still managed to find time to shop, take her kids to school, and complete household chores. Her sister Matisse has been unable to cope and has turned to alcohol in an attempt to cope with her loss.

Question 16 (1 MARK)

Despina would be considered as having high levels of mental wellbeing due to displaying

- A. a profound disturbance to her normal functioning.
- B. an inappropriate level of distress, demonstrating that she is emotionally unstable.
- C. a lack of care for her mother.
- D. an ability to function independently.

Adapted from VCAA Psychology exam 2017 Q39

Question 17 (1 MARK)

In turning to alcohol in an attempt to cope with the death of her mother, Matisse is adopting which approach to deal with stress?

- A. Avoidance coping.
 - B. The flight-or-fight-or-freeze response.
 - C. Coping flexibility.
 - D. Exhaustion.
-

Question 18 (4 MARKS)

Ethan has been experiencing partial sleep deprivation due to only sleeping four to five hours each night for the past two weeks. Because of this, he has been irritable, causing him to experience relationship conflicts and constant stress.

- a. At which point of the mental wellbeing continuum is Ethan most likely to be placed?
Justify your response. (2 MARKS)
- b. Is sleep deprivation an example of an internal or external factor that influences mental health?
Justify your response. (2 MARKS)

Chapter 8 review

Chapter summary

In lesson **8A Ways of considering mental wellbeing**, you learnt about different ways to consider and understand mental wellbeing. In particular, you learnt about:

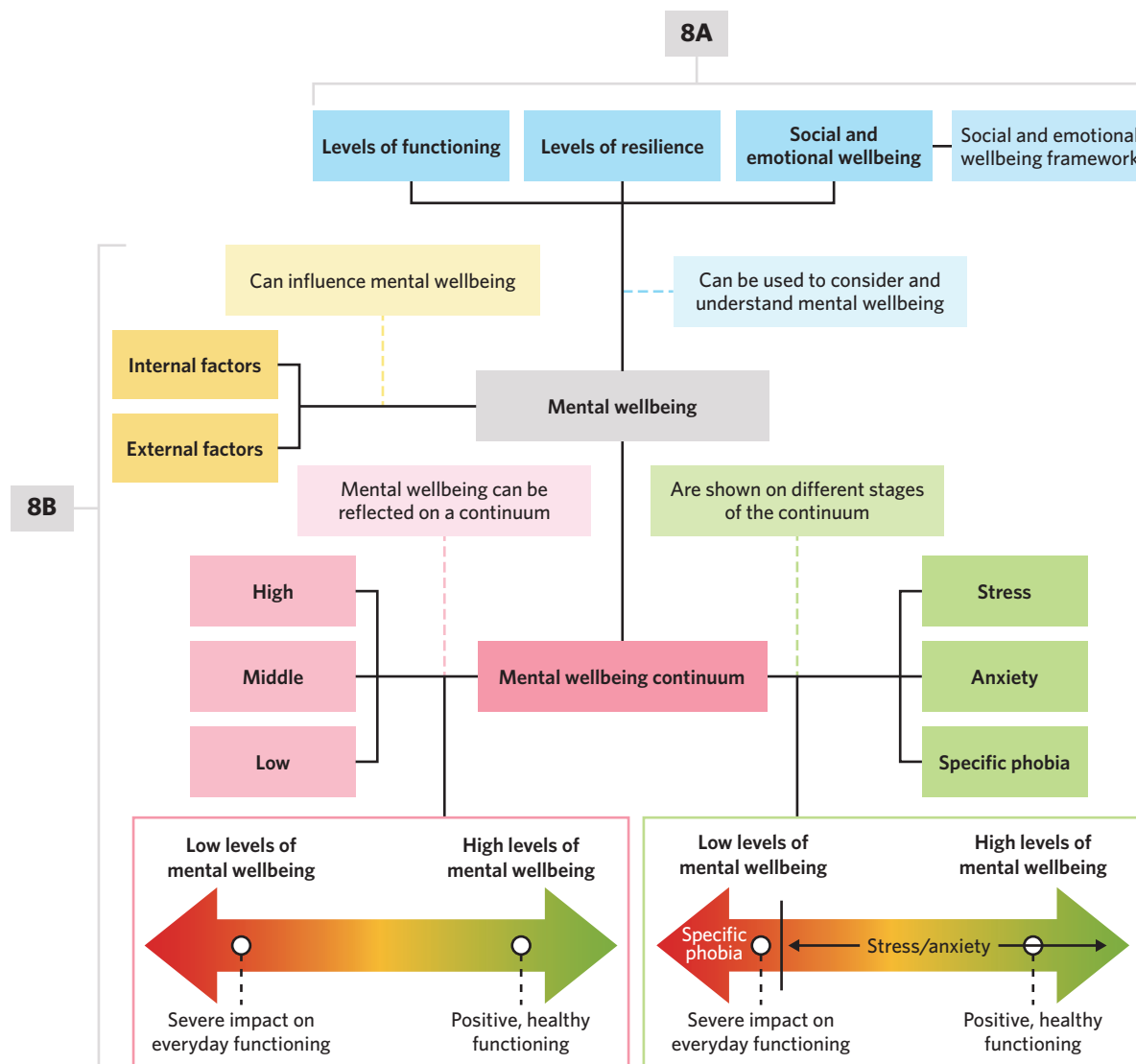
- levels of functioning
- levels of resilience
- social and emotional wellbeing, including the social and emotional wellbeing (SEWB) framework.

In lesson **8B Mental wellbeing as a continuum**, you learnt about how mental wellbeing fluctuates across a continuum, ranging from high levels of mental wellbeing (no disorder) to low levels of mental wellbeing (severe disorder). In particular, you learnt that:

- wellbeing is influenced by internal and external factors
- stress, anxiety, and phobia lie on different points of the mental wellbeing continuum.

You also learnt about the differences between stress, anxiety, and phobia. In particular, you learnt about:

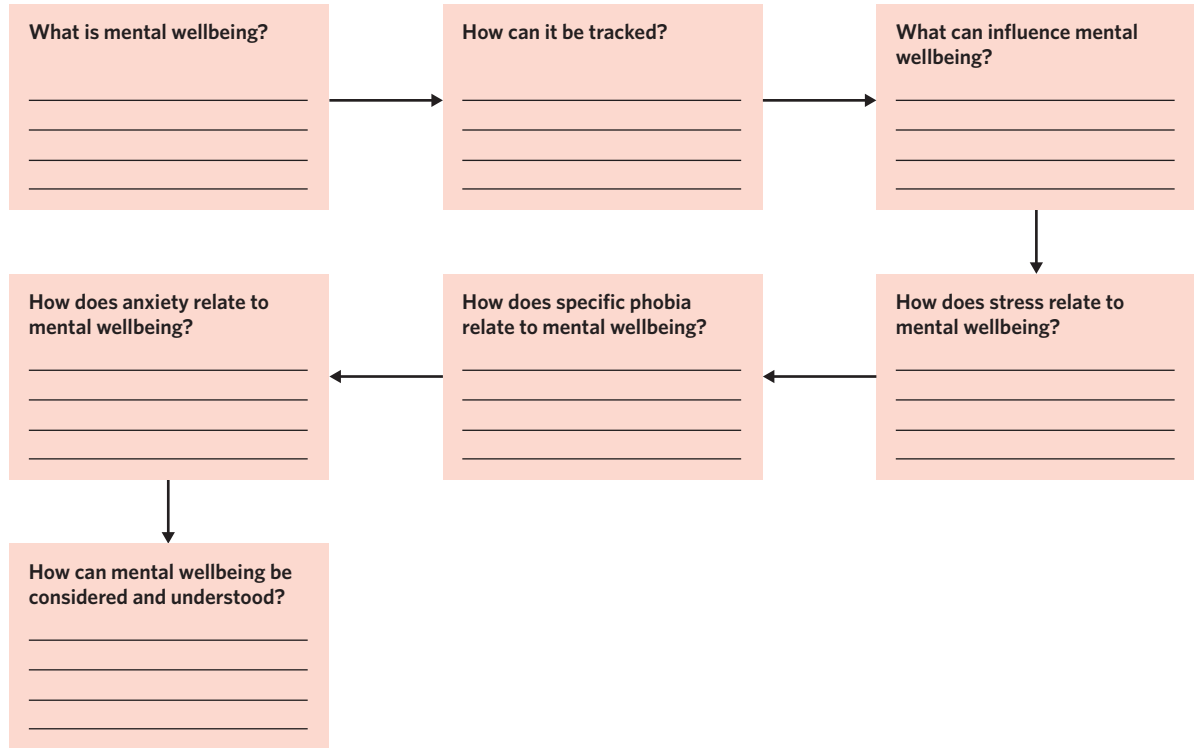
- characteristics of stress and where it is placed on the mental wellbeing continuum
- characteristics of anxiety and where it is placed on the mental wellbeing continuum
- characteristics of specific phobia and where it is placed on the mental wellbeing continuum.



Chapter review activities

Review activity 1: Flow chart

Fill in the blanks in the following flow chart.



Review activity 2: Key concepts

Fill in the table with descriptions of each of the key concepts learnt in this chapter.

| Key concept | Description |
|---|-------------|
| Mental wellbeing | |
| Mental wellbeing continuum | |
| Internal factors | |
| External factors | |
| Stress | |
| Anxiety | |
| Specific phobia | |
| Wellbeing | |
| Levels of functioning | |
| Resilience | |
| Social wellbeing | |
| Emotional wellbeing | |
| Social and emotional wellbeing (SEWB) framework | |
| Multidimensional | |
| Holistic (in relation to SEWB) | |
| Body (in relation to SEWB) | |

| Key concept | Description |
|---|-------------|
| Mind and emotions (in relation to SEWB) | |
| Family and kinship (in relation to SEWB) | |
| Community (in relation to SEWB) | |
| Culture (in relation to SEWB) | |
| Country (in relation to SEWB) | |
| Spirit, spirituality, and ancestors (in relation to SEWB) | |

Chapter 8 test

Multiple choice

Question 1 (1 MARK)

Mental wellbeing is best displayed as

- A. someone having positive thinking patterns and being able to regulate emotions.
- B. someone's lack of mental illness.
- C. someone's current state of mind.
- D. someone's future thinking patterns and ability to regulate emotions.

Question 2 (1 MARK)

Which of the following is the most accurate description of an individual who displays high levels of functioning?

- A. Can carry out everyday tasks and has a strict schedule to follow which cannot be adapted.
- B. Is able to set goals towards achieving tasks and is productive.
- C. Has poor self-efficacy and can effectively communicate.
- D. Has a wide range of emotions and is sensitive to the emotions of others.

Question 3 (1 MARK)

Which of the following best describes the social and emotional wellbeing (SEWB) framework and one of its dimensions?

| | Social and emotional wellbeing (SEWB) framework | Dimension |
|----|---|--|
| A. | A framework that includes some elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples. | Connection to Body: connecting to psychological health in order to participate fully in all aspects of life. |
| B. | A framework that includes some elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples. | Connection to Mind and Emotions: ability to effectively manage thoughts and feelings. |
| C. | A framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples. | Connection to Body: connecting to the physical body and health in order to participate fully in all aspects of life. |
| D. | A framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples. | Connection to Mind and Emotions: inability to effectively manage thoughts and feelings. |

Question 4 (1 MARK)

Which of the following best describes the difference between internal and external factors?

- A. All internal factors stem from a psychological or biological source whereas external factors mainly stem from a social or environmental source.
- B. Internal factors always stay the same from birth, whereas external factors change over time.
- C. Internal factors have a greater impact on an individual's mental health than external factors.
- D. Internal factors arise from the environment, whereas external factors directly arise from within an individual.

Question 5 (1 MARK)

Anxiety can be distinguished from stress because only anxiety

- A. involves eustress and distress.
- B. involves distress only.
- C. can be helpful in small amounts.
- D. can be placed on the mental wellbeing continuum.

Adapted from VCAA Psychology exam 2018 Q37

Short answer**Question 6** (5 MARKS)

Ginger recently got married to her childhood sweetheart. A week before the wedding, she learnt that her grandmother had experienced a stroke. Upon hearing this news, she broke down into tears at work and was sent home early. Ginger's new husband has provided her with support and has been driving her to visit her grandmother and the rest of her family every day.

- a. Identify whether the news of Ginger's grandmother's stroke is an external or internal factor. (1 MARK)
- b. Identify where Ginger would be placed along the mental health continuum after hearing the news of her grandmother's stroke. Justify your response. (2 MARKS)
- c. Explain whether Ginger is displaying social and emotional wellbeing or not. Justify your response. (2 MARKS)

Question 7 (4 MARKS)

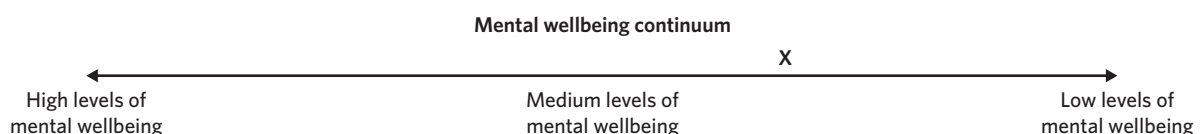
Using examples, discuss how both levels of functioning and resilience can be used to consider mental wellbeing.

Question 8 (5 MARKS)

- a. Compare social wellbeing and emotional wellbeing. (2 MARKS)
- b. What is the social and emotional wellbeing framework? (1 MARK)
- c. The social and emotional wellbeing framework can be described as holistic and multidimensional. Explain what this means. (2 MARKS)

Question 9 (6 MARKS)

Stacey is a high school student who has just started year 12. Stacey is usually very engaged in school and was part of many extracurricular activities, such as soccer. She has a large group of friends and also works at a bookstore part-time. However, Stacey has not been feeling like herself recently and has been withdrawing from some of these things. Stacey has been placed at 'X' on the mental wellbeing continuum based on her mental wellbeing levels.



With reference to ways of considering mental wellbeing, suggest what Stacey's current situation may look like based on her placement on the continuum.

Adapted from VCAA Psychology exam 2019 Q41

Question 10 (4 MARKS)

Amelia and Grace are friends who are both scared of heights. When walking around their local creek one day, they had to cross a fairly high bridge to get over the water. Both girls began to worry as they approached the bridge. When they got to the start of the bridge, Amelia shakily clung to the sides but was able to start making her way across the bridge. On the other hand, Grace, having hated heights since childhood, began to break down in tears and was unable to set foot on the bridge.

In terms of stress, phobia, and anxiety, what did Amelia and Grace experience upon reaching the bridge? Justify your response.

Question 11 (10 MARKS)

Using your knowledge of mental wellbeing, discuss how a VCE student's mental wellbeing can be tracked, considered, and influenced during their final year of school. In your response, ensure that you refer to the mental wellbeing continuum and ways to consider mental wellbeing.



CHAPTER 9

Application of a biopsychosocial approach to explain specific phobia

LESSONS

- 9A** Specific phobia and its contributing factors
- 9B** Evidence-based interventions for specific phobia

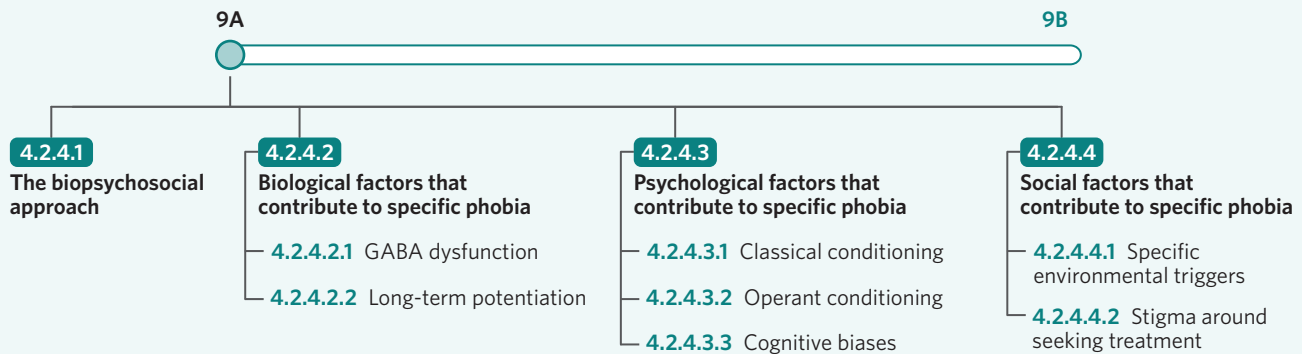
KEY KNOWLEDGE

- the relative influences of factors that contribute to the development of specific phobia, with reference to gamma-aminobutyric acid (GABA) dysfunction and long-term potentiation (biological); behavioural models involving precipitation by classical conditioning and perpetuation by operant conditioning, and cognitive biases including memory bias and catastrophic thinking (psychological); and specific environmental triggers and stigma around seeking treatment (social)
- evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)

9A Specific phobia and its contributing factors

STUDY DESIGN DOT POINT

- the relative influences of factors that contribute to the development of specific phobia, with reference to gamma-amino butyric acid (GABA) dysfunction and long-term potentiation (biological); behavioural models involving precipitation by classical conditioning and perpetuation by operant conditioning, and cognitive biases including memory bias and catastrophic thinking (psychological); and specific environmental triggers and stigma around seeking treatment (social)



In the previous chapter, you learnt about what specific phobia is. But, how and why do people develop a specific phobia? Phobias can arise for many reasons. In this lesson, you will learn about the biological, psychological, and social factors that contribute to the development of specific phobia.

The biopsychosocial approach 4.2.4.1

In this chapter, you will be learning about specific phobia from a biopsychosocial perspective. Therefore, it is important to understand what the biopsychosocial approach is before considering its application to specific phobia. In this section of the lesson, you will learn briefly about the biopsychosocial approach.

Theory details

The **biopsychosocial approach** is a holistic, interdisciplinary framework for understanding the human experience in terms of the influence of biological, psychological, and social factors. This approach highlights that the development and treatment of health concerns is most effective through considering biological, psychological, and social factors as these elements interact to enable improvements in health.

- Biological factors** are internal, genetic, and/or physiologically based factors. These factors can be innate, such as genetic predispositions passed down from one's parents, or can come about later in life, such as through taking certain medications.
- Psychological factors** are internal factors relating to an individual's mental processes, including their cognition, affect, thoughts, beliefs, and attitudes. In essence, psychological factors are everything that an individual experiences within their mind.
- Social factors** are external factors relating to an individual's interactions with others and their external environment, including their relationships and community involvement. This can include close personal relationships as well as an individual's experience within a greater society.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Biopsychosocial approach

a holistic, interdisciplinary framework for understanding the human experience in terms of the influence of biological, psychological, and social factors

Biological factors

internal, genetic, and/or physiologically based factors

Psychological factors

internal factors relating to an individual's mental processes, including their cognition, affect, thoughts, beliefs, and attitudes

It is important to understand how these factors interact to cause and maintain **specific phobias**, which are a type of diagnosable anxiety disorder that is categorised by excessive and disproportionate fear when encountering or anticipating the encounter of a particular stimulus. You learnt about specific phobia in lesson 8B Mental wellbeing as a continuum. In this lesson, you will learn about different factors that can contribute to the development of specific phobia. These are illustrated in figure 1.

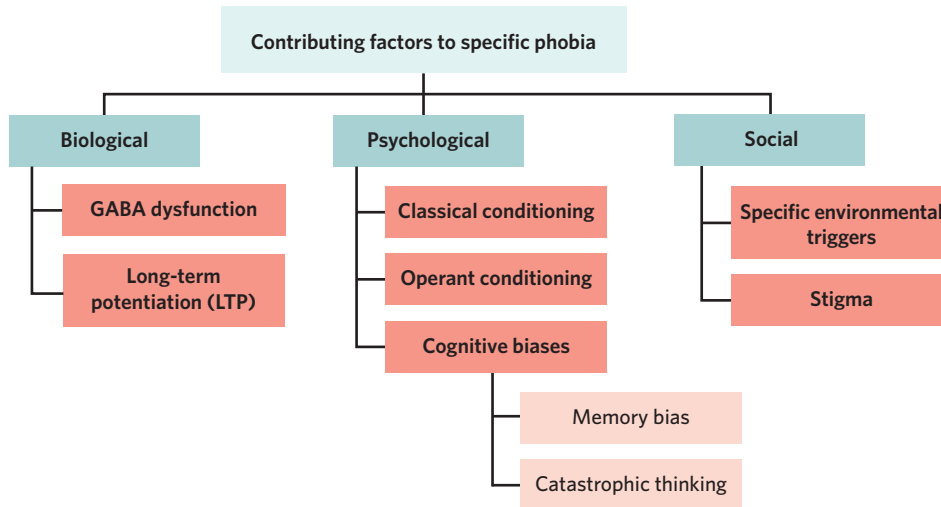


Figure 1 The contributing factors to specific phobia that will be discussed in this lesson

Biological factors that contribute to specific phobia 4.2.4.2

In this section of the lesson, you will learn about biological factors that contribute to the development of specific phobia.

Theory details

Biological contributing factors, which relate to the physiology of an individual's brain and body, may lead to the development of specific phobia. There are two biological factors that you will examine in this lesson that contribute to the development and maintenance of specific phobia:

- abnormalities in neurotransmitter function (GABA dysfunction)
- the role of long-term potentiation.

GABA dysfunction 4.2.4.2.1

GABA (Gamma-amino butyric acid) is the main inhibitory neurotransmitter in the human nervous system. It regulates postsynaptic activation in neural pathways, preventing over-excitation and uncontrolled firing. This is important in regulating the flight-or-fight-or-freeze response and anxiety, as GABA acts to slow or halt the excitatory neural impulse responsible for these reactions.

GABA dysfunction refers to the insufficient neural transmission or reception of GABA in the body. This can be due to a low level or production of GABA, or an insufficient reception or transmission of GABA across the synapse. GABA dysfunction can contribute to the development of phobia because:

- GABA dysfunction may cause someone's flight-or-fight-or-freeze or anxiety response to be activated more easily than someone with adequate GABA levels. This means that, for some people, the stress response is more easily triggered by certain stimuli.
- recurrent stress responses to specific stimuli can lead to the development of a phobia.

Figure 2 visualises one type of GABA dysfunction, specifically, in terms of reception.

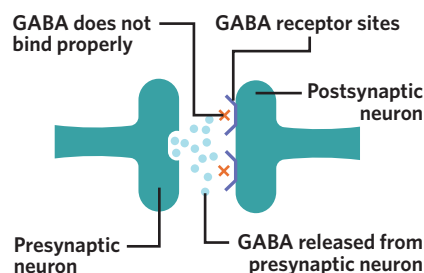


Figure 2 GABA dysfunction involves GABA not binding properly to receptor sites

Social factors

external factors relating to an individual's interactions with others and their external environment, including their relationships and community involvement

Specific phobia

a type of diagnosable anxiety disorder that is categorised by excessive and disproportionate fear when encountering or anticipating the encounter of a particular stimulus

GABA (Gamma-amino butyric acid) the main inhibitory neurotransmitter in the nervous system

GABA dysfunction insufficient neural transmission or reception of GABA in the body

LESSON LINK

In lesson **2C Neurotransmitters and neuromodulators**, you learnt about the role of neural transmission and neurotransmitters, including GABA, in optimal brain functioning. You learnt that GABA has an important role in reducing anxiety. In this lesson, this role is explored further in relation to specific phobia.

Long-term potentiation is the long-lasting and experience-dependent strengthening of synaptic connections that are regularly coactivated

Long-term potentiation 4.2.4.2

Long-term potentiation is the long-lasting and experience-dependent strengthening of synaptic connections that are regularly coactivated. This contributes to the development of phobias by strengthening the association between neural signals involved in perceiving a stimulus and neural signals involved in activating the fear response. Through their repeated coactivation, the signals involved in perceiving a phobic stimulus more readily trigger the activation of the neural signals responsible for the fear response.

For example, when a person fears a spider, two neural signals are coactivated: these are the neural signals involved in perceiving the spider, as well as the neural signals responsible for activating the stress response. The repeated activation of both these neural signals together can lead to the development of a phobia, as the stress response is associated with and activated at the same time as the perception of a certain phobic stimulus. The more this occurs, the stronger the association becomes, and the stronger the phobia becomes.

Figure 3 visualises the role of long-term potentiation in the development of specific phobia.

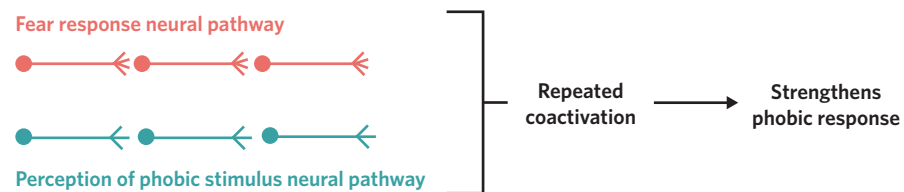


Figure 3 Coactivation of fear response and perception of the phobic stimulus

Psychological factors that contribute to specific phobia 4.2.4.3

In this section of the lesson, you will learn about psychological factors that contribute to the development of specific phobia.

Theory details

There are also psychological contributing factors to specific phobia, which are factors that relate to thoughts and mental processes that can lead to the development of specific phobia. There are three psychological factors that you will examine in this lesson that contribute to the development and maintenance of specific phobia:

- precipitation by classical conditioning
- perpetuation by operant conditioning
- the role of cognitive biases, including memory bias and catastrophic thinking.

Classical conditioning 4.2.4.3.1

As you have learnt, classical conditioning is a model of learning in which organisms learn through the involuntary association of two or more stimuli. Classical conditioning can contribute to the development of phobias by increasing susceptibility to and contributing to their occurrence. This can be described as precipitation by classical conditioning.

Precipitating factors are factors that increase the susceptibility to and contribute to the occurrence of developing a specific phobia. Therefore, classical conditioning can precipitate specific phobia as phobias can be learned, and therefore developed, through classical conditioning.

In terms of classical conditioning, what becomes a phobic stimulus would initially be the neutral stimulus (NS). Through repeated association with an unconditioned stimulus (UCS) that naturally induces fear, the NS becomes the conditioned stimulus (CS) or phobic stimulus, producing the conditioned response (CR) or phobic response. Consequently, classical conditioning is one way in which a phobic response can be acquired. This is presented in figure 4.

Precipitating factors (in relation to specific phobia) factors that increase the susceptibility to and contribute to the occurrence of developing a specific phobia

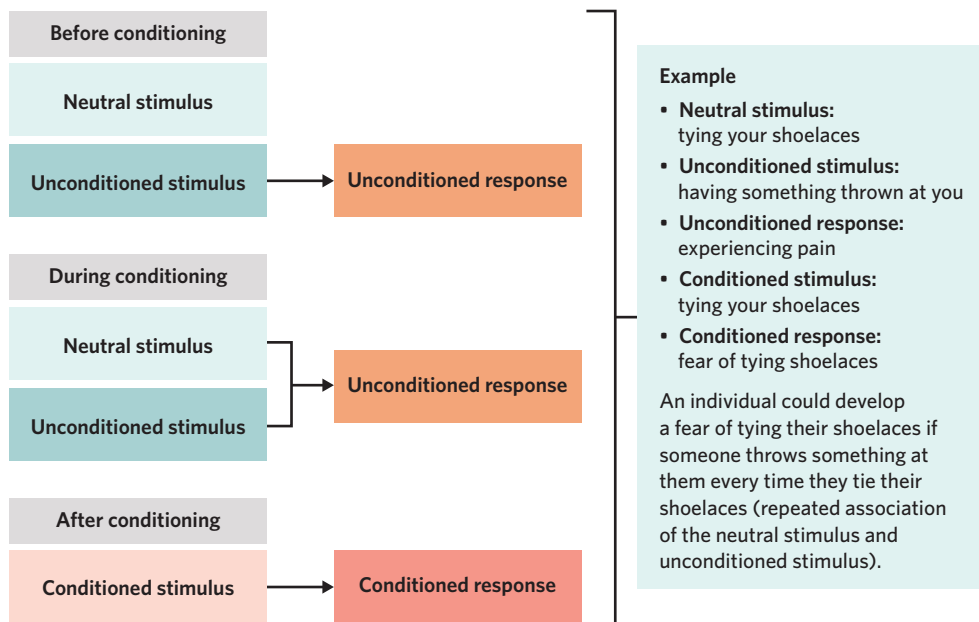


Figure 4 Precipitation of specific phobia by classical conditioning

It has also been suggested by researchers and psychologists that classical conditioning can precipitate a specific phobia without repeated pairings of the neutral stimulus and unconditioned stimulus. If the experience is highly traumatic, an individual can be conditioned to experience a fear response after one pairing of the neutral stimulus and unconditioned stimulus.

Operant conditioning 4.2.4.3.2

As you have previously learnt, operant conditioning involves learning through the association of a behaviour and the consequence it receives. **Perpetuating factors** are factors that inhibit a person's ability to recover from a specific phobia. In this way, operant conditioning perpetuates phobias by preventing an individual from overcoming them.

The role of operant conditioning in phobias can be thought about largely in terms of the consequence stage because:

- an individual with a phobia will generally avoid contact with their phobic stimulus at all costs.
- by avoiding confrontation with the phobic stimulus, a person is negatively reinforced through this avoidance in not having to deal with their fear response.
- over time, this reinforcement strengthens or maintains the phobic response, making avoidance behaviours more likely to be repeated and preventing recovery through this cycle.

The role of operant conditioning in the perpetuation of specific phobia is illustrated in figure 5.

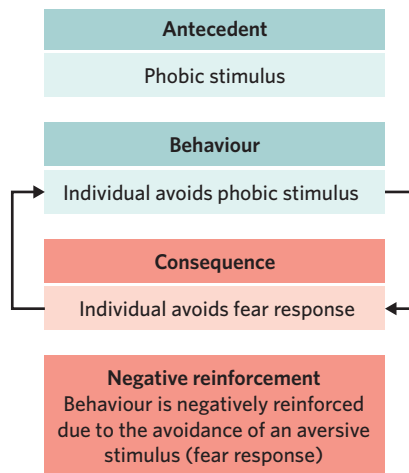


Figure 5 Perpetuation of specific phobia by classical conditioning

Perpetuating factors
(in relation to specific phobia) factors that inhibit a person's ability to recover from a specific phobia

Cognitive biases 4.2.4.3.3

A **cognitive bias** is a predisposition to think about and process information in a certain way. This may cause errors in people's judgements and thoughts. Cognitive biases contribute to phobias because some people consider certain stimuli as particularly harmful, dangerous or scary. There are two cognitive biases you should be familiar with:

- **Memory bias** is a type of cognitive bias caused by inaccurate or exaggerated memory. As phobias are often caused by traumatic events, people may remember the trauma as extremely significant or harmful, and this impacts their present cognitions about related stimuli. For example, people with arachnophobia (fear of spiders) may recall the size of a spider they encountered as much bigger than it was in reality. This inaccurate memory of the spider's size may serve to justify their extreme fear of spiders and the threat they pose after the encounter. This in turn allows their phobic fears to persist over time in their mind.

Cognitive bias
a predisposition to think about and process information in a certain way

Memory bias a type of cognitive bias caused by inaccurate or exaggerated memory

Catastrophic thinking a type of cognitive bias in which a stimulus or event is predicted to be far worse than it actually is

- **Catastrophic thinking** is a type of cognitive bias in which a stimulus or event is predicted to be far worse than it actually is. A person will often imagine the worst-case scenario possible when imagining an interaction with their phobic stimulus. This contributes to phobia, making stimuli seem worthy of extreme fear and anxiety. For example, people with arachnophobia (fear of spiders) may think that if they encounter any type of spider, they will get bitten and die. However, there are many possible outcomes that do not involve the person being hurt, such as the spider crawling away or the spider being harmless.

Social factors that contribute to specific phobia 4.2.4.4

In this section of the lesson, you will learn about social factors that contribute to the development of specific phobia.

Theory details

Social factors are those which involve some sort of interaction with other people or the environment. There are two social contributing factors to phobia that you will learn about in this lesson:

- specific environmental triggers
- stigma around seeking treatment.

Specific environmental triggers 4.2.4.4.1

There is a range of interactions a person can have that lead to the development of a specific phobia. **Specific environmental triggers** refer to stimuli or experiences in a person's environment that evoke an extreme stress response, leading to the development of a phobia. There are a few different types of environmental triggers, including:

- direct confrontation with a traumatic stimulus or event, e.g. being bitten by a snake.
- observing another person having a direct confrontation with a traumatic stimulus or event, e.g. watching someone be threatened with a weapon.
- learning about a potentially dangerous or traumatic stimulus or event indirectly, e.g. by watching a movie about threatening motorcycle gangs or reading about the danger of snakes.

Figure 6 explores these three types of specific environmental triggers.



Figure 6 Different types of specific environmental triggers

Stigma around seeking treatment 4.2.4.4.2

Leaving one's phobia untreated also contributes to the development and maintenance of specific phobia. Often, people will not seek help due to embarrassment, worry, or fear.

Stigma refers to the feeling of shame or disgrace experienced by an individual for a characteristic that differentiates them from others. In this way, stigma around seeking treatment refers to the sense of shame a person might feel about getting professional help for their phobia. As phobias tend to involve some degree of irrational fear, seeking help can be very difficult. They might feel as though their phobia is too embarrassing or insignificant to seek professional help, or as though they are unusual and isolated from society in some way for doing so.

Stigma the feeling of shame or disgrace experienced by an individual for a characteristic that differentiates them from others

Theory summary

In this lesson, you learnt about specific phobia, and the biological, psychological, and social factors that contribute to the development of specific phobia.

9A Questions

Theory review

Question 1

Which of the following can influence the development of specific phobia? **(Select all that apply)**

- I. Biological factors.
- II. Psychological factors.
- III. Nutritional factors.
- IV. Social factors.

Question 2

A healthy level of neurotransmitters in the body can contribute to the development of specific phobia.

- A. True.
- B. False.

Question 3

An individual with a specific phobia will often _____ their phobic stimulus, which can _____ reinforce avoidance.

Which of the following best fills in the blanks?

- A. avoid, negatively
- B. confront, positively

Question 4

Stigma around seeking treatment can negatively impact recovery from specific phobia.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 5

Which of the following is most correct?

- A. Perpetuating factors (in relation to specific phobia) are factors that **stop** a person's ability to **return** from a specific phobia.
- B. Perpetuating factors (in relation to specific phobia) are factors that **inhibit** a person's ability to **recover** from a specific phobia.

Question 6

Which of the following is most correct?

- A. GABA dysfunction is an **insufficient** neural transmission or reception of GABA in the body.
- B. GABA dysfunction is a **lower** neural transmission or reception of GABA in the body.

Question 7

Which of the following is most correct?

- A. Specific environmental triggers refer to stimuli or experiences in a person's **environment** that prompt an extreme stress **response**, leading to the development of a phobia.
- B. Specific environmental triggers refer to stimuli or experiences in a person's **circumstances** that prompt an extreme stress **result**, leading to the development of a phobia.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Question 8

Which of the following correctly outlines a difference between GABA dysfunction and precipitation by classical conditioning in the development of specific phobia?

- A. GABA dysfunction is a biological factor whereas precipitation by classical conditioning is a psychological factor.
- B. GABA dysfunction is a psychological factor whereas precipitation by classical conditioning is a biological factor.

Question 9

Which of the following correctly outlines a similarity between catastrophic thinking and memory bias in the development of specific phobia?

- A. They are both social factors.
- B. They are both psychological factors.

Question 10

Which of the following correctly outlines a difference between specific environmental triggers and long-term potentiation in the development of specific phobia?

- A. Specific environmental triggers are social factors whereas long-term potentiation is a biological factor.
- B. Specific environmental triggers are psychological factors whereas long-term potentiation is a biological factor.

Exam-style**Remember and understand****Question 11** (1 MARK)

Gamma-amino butyric acid (GABA) dysfunction can be a biological contributing factor to specific phobia when

- A. there is an excess of this inhibitory neurotransmitter.
- B. there is a deficiency of this inhibitory neurotransmitter.
- C. there is an excess of this excitatory neurotransmitter.
- D. there is a deficiency of this excitatory neurotransmitter.

Adapted from VCAA Psychology exam 2017 Q15

Question 12 (1 MARK)

In terms of psychological contributing factors to phobia, behavioural models suggest that

- A. classical conditioning perpetuates phobia while operant conditioning precipitates phobia.
- B. classical conditioning precipitates phobia while operant conditioning perpetuates phobia.
- C. classical conditioning prolongs phobia while operant conditioning prevents phobia.
- D. classical conditioning prevents phobia while operant conditioning prolongs phobia.

Question 13 (2 MARKS)

In terms of psychological contributing factors, explain the role of operant conditioning in the development of specific phobia.

Question 14 (2 MARKS)

Describe the role of long-term potentiation in the development of specific phobia.

Apply and analyse

Use the following information to answer questions 15 and 16.

Kabir is enormously afraid of grapes and has been since he was a small child. He feels extremely discomforted by their texture and the noise they make when bitten. He refuses to see a psychologist about it, as he feels his fear is embarrassing and not important enough to ask for help.

Question 15 (1 MARK)

In terms of social contributing factors to phobia, Kabir's embarrassment is an example of

- A. a specific environmental trigger.
- B. perpetuation.
- C. stigma around seeking treatment.
- D. precipitation.

Adapted from VCAA Psychology sample exam 2017 Q21

Question 16 (1 MARK)

In terms of neural plasticity, Kabir's stress in response to grapes may have been developed by

- A. long-term depression.
- B. gamma-amino butyric acid (GABA) dysfunction.
- C. long-term potentiation.
- D. glutamate dysfunction.

Question 17 (4 MARKS)

Carson has a phobia of crowds and will always avoid places where he knows that there will be lots of people. Even when he shuts his eyes and imagines being in a crowd, Carson feels anxious and his heart begins to beat faster.

- a. Describe how gamma-amino butyric acid (GABA) dysfunction might contribute to Carson's phobic response. (2 MARKS)
- b. Outline one possible social contributing factor that may have contributed to the development of Carson's phobia of crowds. (2 MARKS)

Question 18 (4 MARKS)

Flynn has a phobia of repeated patterns of hexagonal shapes. As a child, he walked past a construction site and saw a metal fence with hundreds of hexagons all in a row. He remembers them making him feel nauseous and uneasy, recalling it to be the most horrific experience he ever had. Now, if Flynn sees a metal fence in the distance, he will not walk near it out of fear that it will have hexagon shapes and that these will set off an embarrassing public breakdown.

In terms of psychological contributing factors to phobia, identify and explain the cognitive biases Flynn is presenting and how they contribute to his phobia of repeated patterns of hexagons.

Questions from multiple lessons**Question 19** (1 MARK)

The division of the nervous system activated by a phobic stress response would be

- A. the sympathetic nervous system.
- B. the parasympathetic nervous system.
- C. the somatic nervous system.
- D. the autonomic nervous system.

Question 20 (8 MARKS)

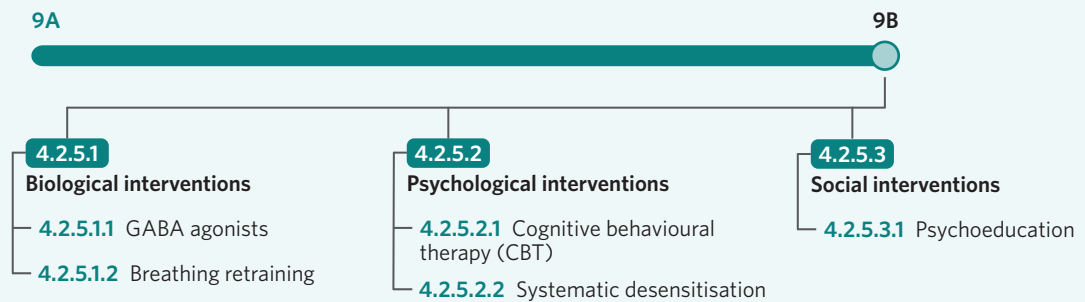
Maia wanted to test why some people developed phobias, and others didn't. She tested her hypothesis on her two younger siblings by repeatedly leaving bugs in their room and recording each time she could see they were scared. Her younger brother seemed to be scared of the bugs, so much so that he didn't want to go out into the garden anymore because he was afraid there were bugs there. However, her younger sister didn't seem to be scared by the bugs at all and when she found them in her room, she would pick them up and put them back outside.

- a. Write a possible hypothesis for Maia's experiment. (3 MARKS)
- b. Outline one ethical consideration that Maia did not take into account. (2 MARKS)
- c. Outline three characteristics of specific phobia. (3 MARKS)

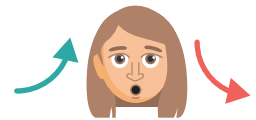
9B Evidence-based interventions for specific phobia

STUDY DESIGN DOT POINT

- evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)



There are many different ways phobias can develop, and in the same way, there are also many different ways phobias can be treated. In the previous lesson you learnt about the biopsychosocial factors that contribute to the development of specific phobias. In this lesson, you will learn about the biopsychosocial interventions for specific phobias.



Biological interventions 4.2.5.1

In this section of the lesson, you will learn about evidence-based biological interventions for specific phobia.

Theory details

Biological interventions for phobias are treatments which address the physiological aspects of phobias. Figure 1 presents the evidence-based biological interventions you will learn about in this lesson. Evidence-based interventions have undergone rigid scientific testing and involve the combination of the best scientific evidence with expertise from practicing clinicians to provide the most effective services for the needs of each individual.

GABA agonists 4.2.5.1.1

As you learnt in lesson 9A Specific phobia and its contributing factors, GABA dysfunction is one of the biological factors that contribute to the development of a specific phobia. The lack of inhibitory neural transmission in the body leads to over-excitation at the synapses, and this decreased ability to regulate neural firing can lead to feelings of anxiety. Therefore, combatting GABA dysfunction can reduce the development of specific phobia. This can be achieved through the use of benzodiazepines.

Benzodiazepines are a type of medication that depresses central nervous system activity and is often used as a short-acting anti-anxiety medication. Benzodiazepines are considered to be **agonists**, which are a type of drug that imitates neurotransmitters and works to initiate a neural response (excitatory or inhibitory) when it binds to the receptor sites of a neuron. As you have learnt, GABA dysfunction contributes to the development of a specific phobia. Specifically, when experiencing a phobic fear response, individuals with GABA dysfunction will experience an over-excitation of neural pathways. Benzodiazepines can be used to treat this GABA dysfunction. As an agonist, benzodiazepines bind to GABA receptor sites and mimic the effects of GABA to increase its inhibitory response. By inducing inhibitory responses, the rapid excitatory communication between neurons in the fear response is reduced, relieving the anxiety it causes and leading to the relaxation of muscles. The function of benzodiazepines as GABA agonists is reflected in figure 2.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

Biological interventions

- GABA agonists
- Breathing retraining

Figure 1 Biological interventions for specific phobia discussed in this lesson

KEY TERMS

Benzodiazepines a type of medication that depresses central nervous system activity and is often used as a short-acting anti-anxiety medication

Agonists a type of drug that imitates neurotransmitters and works to initiate a neural response (excitatory or inhibitory) when it binds to the receptor sites of a neuron

1. Benzodiazepines bind to a GABA receptor site on a postsynaptic neuron.
2. The benzodiazepines increase the effectiveness of GABA when it later binds to the same receptor sites and mimics its effects.
3. GABA is able to then have its inhibitory effect, reducing the likelihood that the neuron will fire. This acts temporarily to reduce neural communication, in turn reducing anxiety.

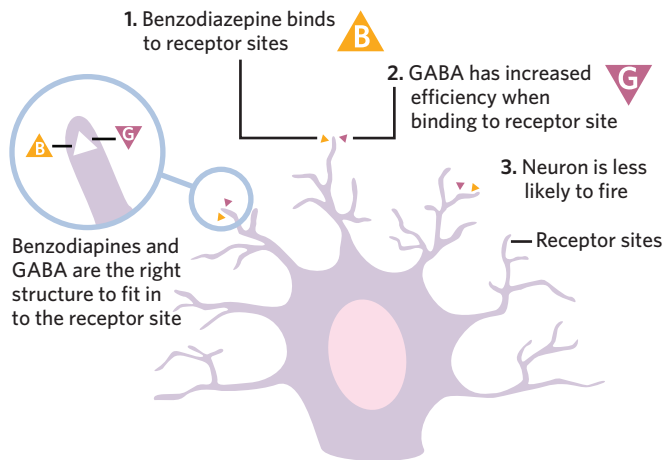


Figure 2 How benzodiazepines work as GABA agonists

WANT TO KNOW MORE?

There are also drugs called antagonists, which work by preventing an action at the receptor site by blocking the effect of a neurotransmitter. Antagonists operate with similar mechanisms to agonists, except rather than initiating a response (as agonists do), they work to prevent a response occurring at the synapse.

Breathing retraining a method used to teach breathing control techniques that may reduce physiological arousal

Breathing retraining 4.2.5.1.2

Breathing retraining is a method used to teach breathing control techniques that may reduce physiological arousal. Therefore, breathing retraining can be used by an individual when they are experiencing anxiety in the presence of their phobic stimulus. When someone with specific phobia is facing their phobic stimulus, they often experience fast, shallow breathing as their sympathetic nervous system becomes dominant. This can lead to hyperventilation and the engagement of other sympathetic nervous system responses, and in turn, increased anxiety. Table 1 discusses the process of breathing retraining as an intervention for specific phobia.

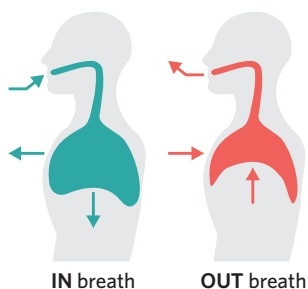


Figure 3 Breathing retraining is a type of breathing technique involving breathing in through the nose and out through the mouth

Table 1 The process of breathing retraining

| | Explanation |
|---------------|--|
| Step 1 | <p>A psychologist or doctor will teach a person with a specific phobia how to consciously control their breathing. This will include:</p> <ul style="list-style-type: none"> • slow and deep inhalations, followed by slow and controlled exhalations • counting slowly when breathing in, and when breathing out • breathing slowly in through the nose, and focusing on breathing out slowly from the diaphragm. <p>This is illustrated in figure 3.</p> |
| Step 2 | <p>The learner applies the breathing techniques learnt in step 1 when in the presence of a phobic stimulus. For example, by counting aloud or in their head, or imagining the therapist saying the instructions to them when in the presence of the phobic stimulus. This restores the amount of oxygen in the body to an optimal level to help the parasympathetic nervous system become dominant, in turn decreasing the dominance of the sympathetic nervous system and reducing anxiety.</p> |

Psychological interventions 4.2.5.2

In this section of the lesson, you will learn about psychological interventions for specific phobia.

Theory details

Psychological interventions for specific phobias address the mental processes which contribute to a specific phobia. Figure 4 presents the evidence-based psychological interventions you will learn about in this lesson.

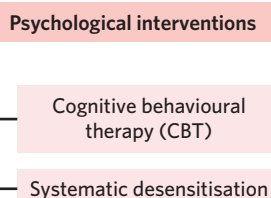


Figure 4 Psychological interventions for specific phobia discussed in this lesson

The psychological interventions discussed in this lesson can be described as psychotherapeutic treatments. **Psychotherapeutic treatments** address dysfunctional emotions, thoughts, and behaviours through therapeutic communication. As such, these treatments are psychological in nature rather than medical, and are used for mental-related conditions. They often involve talking therapy.

Cognitive behavioural therapy (CBT) 4.2.5.2.1

Cognitive behavioural therapy (CBT) is a form of psychotherapy that encourages individuals to substitute dysfunctional cognitions and behaviours with more adaptive ones.

CBT involves a cognitive and a behavioural component.

- The cognitive component involves:
 - identifying negative thoughts and feelings (cognitions) about the issue.
 - replacing these negative thoughts and feelings with more positive ones.
- The behavioural component involves:
 - identifying negative behaviours relating to the issue.
 - developing and maintaining more positive behaviours relating to the issue.

Therefore, when treating an individual with a specific phobia, a therapist first has to work with the patient to identify their cognitions and behaviours that may perpetuate and contribute to their specific phobia. Once identified, the therapist and counsellor can then work to modify these unhealthy cognitions and behaviours. Table 2 presents some dysfunctional cognitions and behaviours that may contribute to and perpetuate specific phobia.

Table 2 Cognitions and behaviours that may contribute to and perpetuate specific phobia

| Cognitions | Behaviours |
|--|--|
| <ul style="list-style-type: none"> • Memory bias • Catastrophic thinking • A belief that the phobia can never be overcome • A belief that the phobia can only get worse • Embarrassment • Extreme fear | <ul style="list-style-type: none"> • Avoidance behaviours in which a person avoids their phobic stimulus and anything related to it at all costs • Not seeking help • Avoiding social activities that may expose a person to their phobia |

The presence of these cognitions and behaviours can mutually reinforce each other and perpetuate a phobia. This is shown in figure 5, in which various cognitions and behaviours contribute to each other.

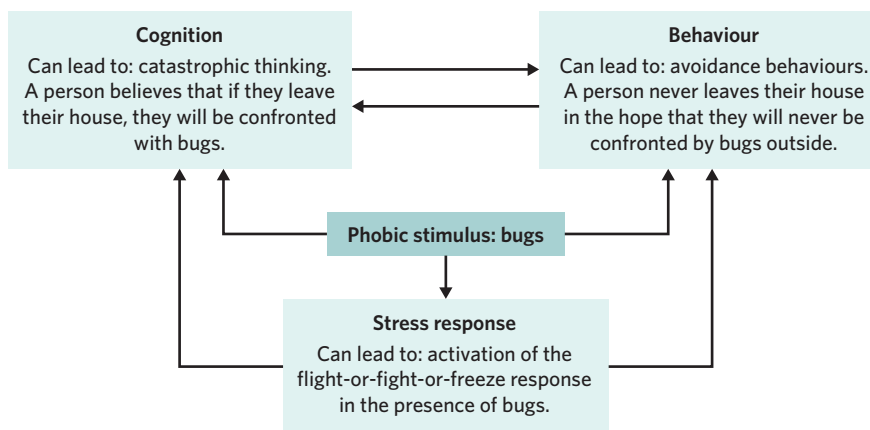


Figure 5 Cognitions and behaviours can mutually reinforce each other

Once the individual understands the interrelationship between dysfunctional behaviours and cognitions, a therapist will work with them to develop strategies to overcome them. This involves identifying both cognitions and behaviours that are healthier, which could potentially replace the dysfunctional ones. In terms of cognitions, this could involve challenging them as hypotheses. For example, an individual who believes that they will die in a plane crash will be asked to consider that it is statistically unlikely. Healthier behaviours are also recommended, such as going out and not performing avoidance behaviours, as well as employing relaxation techniques.

Psychotherapeutic treatments treatments that address dysfunctional emotions, thoughts, and behaviours through therapeutic communication

Cognitive behavioural therapy (CBT) a form of psychotherapy that encourages individuals to substitute dysfunctional cognitions and behaviours with more adaptive ones

Systematic desensitisation is a therapeutic technique used to overcome phobias that involves a patient being exposed incrementally to increasingly anxiety-inducing stimuli, combined with the use of relaxation techniques

Systematic desensitisation 4.2.5.2

Systematic desensitisation is a therapy technique used to overcome phobia involving a patient being exposed incrementally to increasingly anxiety-inducing stimuli, combined with the use of relaxation techniques.

In lesson 9A Specific phobia and its contributing factors, you learnt that classical conditioning contributes to the development of the conditioned fear response in phobia. Systematic desensitisation operates on the principles of classical conditioning, aiming to de-condition the association between the phobic stimulus and fear, by associating the phobic stimulus instead with relaxation. There are four steps involved in the systematic desensitisation process, which are outlined in table 3.

Table 3 The process of systematic desensitisation

| Steps | Details |
|--|--|
| <p>1. The learning of relaxation techniques. A therapist might teach a patient a technique they can apply to reduce the physiological arousal and anxiety involved in the fear response.</p> | One technique commonly used is breathing control, such as that outlined in breathing retraining. |
| <p>2. The development of a fear hierarchy. This involves creating a list of anxiety-inducing experiences relating to the patient's phobia, listed in order of easiest to confront, to the most difficult to confront.</p> | For a person with a phobia of bugs, a fear hierarchy may look like: <ol style="list-style-type: none"> 1. Reading about bugs. 2. Drawing a picture of bugs. 3. Looking at cartoon bugs. 4. Looking at photos of bugs in a book. 5. Looking at videos of bugs online. 6. Being in the same house as a bug. 7. Being in the same room as a bug. 8. Standing directly in front of a bug. 9. Directly touching a bug. |
| <p>3. The gradual step-by-step exposure. The gradual step-by-step exposure to each item of the fear hierarchy, beginning with the least anxiety-inducing stimulus, paired with practice of the learnt relaxation techniques with each new exposure.</p> | Each exposure to a step in the fear hierarchy is done in a controlled manner, with the use of relaxation techniques at each step. The patient does not move on to the next item in their fear hierarchy until the fear response is eliminated at each level. |
| <p>4. The continuation of this systematic exposure. The continuation of this exposure to items on the fear hierarchy until the most fear-inducing stimulus can be faced without producing the phobic response.</p> | This process is often done with a therapist. At the end of this stage, a patient can confront their most fear-inducing stimulus without a fear response. |

Social interventions 4.2.5.3

In this section of the lesson, you will learn about social interventions for specific phobia.

Theory details

Social interventions are those which act to address the social and environmental causes of phobias. Figure 6 presents the evidence-based social interventions you will learn about in this lesson.

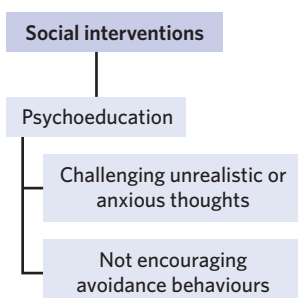


Figure 6 Social interventions for specific phobia discussed in this lesson

Psychoeducation 4.2.5.3.1

Psychoeducation involves teaching families and supporters of individuals with mental health disorders how to better understand, deal with, and treat their disorder. Therefore, it can be used to help educate families and supporters of individuals with specific phobia. Psychoeducation can also involve providing more general education about the nature of phobia to increase families' and supporters' understanding of the mental health disorder. This can be beneficial to both the person with the phobia and their family and supporters. There are two important components of psychoeducation that are taught to families and supporters:

- challenging unrealistic or anxious thoughts of the individual, and
- not encouraging avoidance behaviours.

These are described in table 4.

Table 4 Components of psychoeducation

| Challenging unrealistic or anxious thoughts | Not encouraging avoidance behaviours |
|---|--|
| As you've learnt, a person with a phobia often has unrealistic and anxious thoughts about their phobic stimulus. This can present in the form of extreme anxiety, catastrophic thinking, and memory biases. Family and supporters are encouraged to actively challenge these thoughts in order to help a person with a specific phobia to understand that some cognitive components of their fears are potentially unfounded and irrational. This should be done in a supportive, non-judgemental fashion. Like in CBT, this can help the person with a phobia begin to recognise their dysfunctional thoughts. | Phobias cannot be solved through avoidance behaviours. While avoidance coping strategies might be useful for relieving less severe forms of stress, they do not provide long-term solutions for phobias. This is because phobias involve a deeply ingrained fear response that cannot be eliminated entirely with temporary fixes. As such, families and supporters are taught that they should not encourage avoidance behaviours, as they do not solve and only perpetuate the phobic anxiety. |

Psychoeducation

teaching families and supporters of individuals with mental health disorders how to better understand, deal with, and treat their disorder

USEFUL TIP

It is important to recognise and understand that all the evidence-based interventions in this lesson are equally effective, and that specific phobia is best managed when using a combination of biological, psychological, and social evidence-based interventions. For example, question seven in the VCAA Psychology Exam 2021 considered both benzodiazepines and systematic desensitisation in the treatment of phobia. Similarly, question two in the VCAA Psychology Exam 2018 required students to apply the biopsychosocial approach to phobia. When applying this theory, consider how these interventions can work together for the best outcome!

Theory summary

In this lesson, you learnt about the biopsychosocial evidence-based interventions for specific phobia. Figure 7 provides a summary of these interventions.

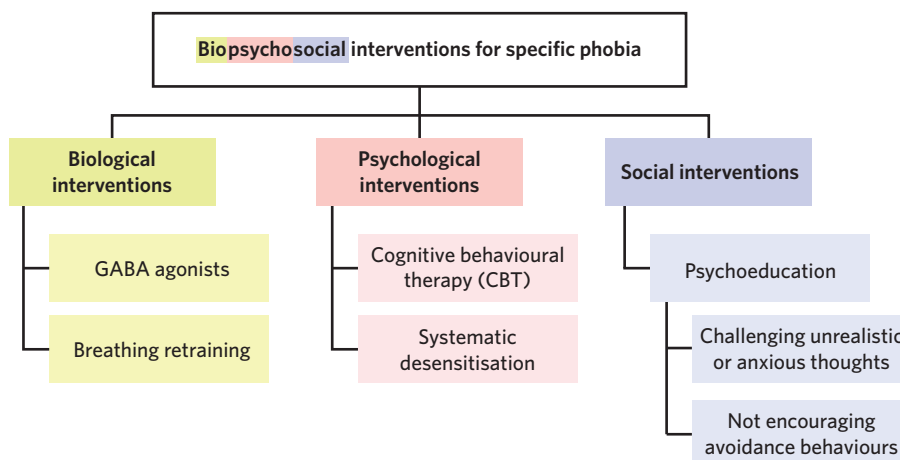


Figure 7 Summary of lesson 9B

9B Questions

Theory review

Question 1

Specific phobia can be managed through different evidence-based interventions.

- A. True.
- B. False.

Question 2

Evidence-based interventions for specific phobia can be which of the following? **(Select all that apply)**

- I. Biological.
- II. Psychological.
- III. Social.
- IV. Sustainable.

Question 3

Which of the following is a possible evidence-based intervention for specific phobia? **(Select all that apply)**

- I. Cognitive behavioural therapy.
- II. Psychoeducation.
- III. Avoidance therapy.
- IV. Breathing retraining.

Question 4

GABA _____ can be used as a _____ evidence-based intervention for specific phobia, as they help mimic the effects of _____.

Which of the following best fills in the blanks?

- A. agonists, biological, GABA
- B. agonists, psychological, anxiety

Question 5

Specific phobia is best treated through social evidence-based interventions.

- A. True.
- B. False.

Assessment skills

Perfect your phrasing

Question 6

Which of the following sentences is most correct?

- A. Psychoeducation is teaching families and supporters of individuals with specific phobia how to **easily** understand, **cope** with, and **diagnose** mental disorders.
- B. Psychoeducation is teaching families and supporters of individuals with specific phobia how to **better** understand, **deal** with, and **treat** mental disorders.

Question 7

Which of the following sentences is most correct?

- A. Systematic desensitisation is a therapy technique used to **manage** phobia involving a patient being exposed **slowly** to increasingly anxiety-inducing stimuli, combined with the use of relaxation **therapies**.
- B. Systematic desensitisation is a therapy technique used to **overcome** phobia involving a patient being exposed **incrementally** to increasingly anxiety-inducing stimuli, combined with the use of relaxation **techniques**.

Question 8

Which of the following sentences is most correct?

- A. Benzodiazepines are a type of short-acting, anti-anxiety medication that work to **reduce** anxiety.
- B. Benzodiazepines are a type of short-acting, anti-anxiety medication that work to **inhibit** anxiety.

Compare and evaluate

The following assessment skills type reflects the study design assessment type:

- comparison and evaluation of psychological concepts, methodologies, and methods, and findings from three student practical activities

Use the following information to answer questions 9–12.

Len has a specific phobia of stairs. He cannot go anywhere where there might be stairs and he gets anxious thinking about stairs or seeing them on TV. This significantly interferes with his daily life, so he is getting some professional advice on how to deal with his specific phobia. His doctor has prescribed him benzodiazepines to take when he is exposed to stairs. Len is also partaking in cognitive behavioural therapy and systematic desensitisation. Len's mother has been worried about what to do and has been advised by professionals to let Len avoid stairs because they make him so uncomfortable.

Question 9

Which of the following best outlines a difference between benzodiazepines and cognitive behavioural therapy?

- A. Benzodiazepines are a psychological evidence-based intervention for specific phobia whereas cognitive behavioural therapy is a biological evidence-based intervention for specific phobia.
- B. Benzodiazepines are a biological evidence-based intervention for specific phobia whereas cognitive behavioural therapy is a psychological evidence-based intervention for specific phobia.

Question 10

Which of the following best evaluates the advice that Len's mother was given?

- A. Len's mother was given advice that does not align with evidence-based interventions, as Len's mother should be taught to encourage Len to not avoid stairs, as a part of psychoeducation.
- B. Len's mother was given advice that does align with evidence-based interventions, as Len's mother should be taught to encourage Len to avoid stairs, as a part of psychoeducation.

Question 11

Which of the following best outlines a similarity between cognitive behavioural therapy and systematic desensitisation?

- A. Cognitive behavioural therapy and systematic desensitisation are both psychological evidence-based interventions for specific phobia.
- B. Cognitive behavioural therapy and systematic desensitisation are both social evidence-based interventions for specific phobia.

Question 12

Which of the following best evaluates the advice of Len's doctor to take benzodiazepines?

- A. Len's doctor gave advice that does not align with evidence-based interventions, as benzodiazepines can promote GABA dysfunction.
- B. Len's doctor gave advice that does align with evidence-based interventions, as benzodiazepines can treat GABA dysfunction.

Exam-style**Remember and understand****Question 13** (1 MARK)

Psychoeducation for family and supporters of a person with phobia works as

- A. a psychological intervention that teaches the importance of challenging unrealistic thoughts and not encouraging avoidance behaviours.
- B. a social intervention that teaches the importance of challenging unrealistic thoughts and not encouraging avoidance behaviours.
- C. a psychological intervention that teaches the importance of breathing retraining and exercise.
- D. a biological intervention that teaches the importance of breathing retraining and exercise.

Question 14 (3 MARKS)

Explain how breathing retraining can be used to reduce phobic anxiety.

Question 15 (4 MARKS)

Describe how benzodiazepines work as short-acting anti-anxiety agents to treat phobias.

Apply and analyse**Use the following information to answer questions 16 and 17.**

Omer has been experiencing uncontrollable anxiety whenever he thinks about going to work. He has nightmares every night before work, and always arrives at work shaky and with a high heart rate. Omer's psychologist works with him to overcome his phobia and also explains to his mother the importance of not letting her son stay home from work when he is feeling anxious.

Question 16 (1 MARK)

When the psychologist spoke to Omer's mother, she was using

- A. psychoeducation about the need to challenge unrealistic thoughts.
- B. psychoeducation about the need to not encourage avoidance behaviours.
- C. cognitive behavioural therapy.
- D. systematic desensitisation.

Question 17 (1 MARK)

Omer's doctor prescribed him the GABA agonist benzodiazepine to take when he goes to work.

A benzodiazepine can treat specific phobia by

- A. increasing the inhibitory effect of GABA.
- B. increasing the excitatory effect of GABA.
- C. decreasing the inhibitory effect of GABA.
- D. decreasing the excitatory effect of GABA.

Adapted from VCAA Psychology exam 2017 Q45

Question 18 (7 MARKS)

Eliza has had a phobia of cats ever since she was little. She always feels nervous when walking down suburban streets, and will cross the road if she sees a cat in someone's front yard.

- a. Explain how systematic desensitisation can be used to help Eliza overcome her phobia of cats. (4 MARKS)
Adapted from VCAA Psychology exam 2017 Q4e
- b. Describe how one other psychological intervention for phobia can be used to help Eliza with her phobia of cats. (3 MARKS)

Questions from multiple lessons**Question 19** (5 MARKS)

Grayson has a phobia of germs, and has recently moved into someone's old room in a friend's apartment. He can't stop thinking about the germs the person who used to live in his room might have left behind, and this often keeps him from being able to fall asleep at night.

- a. How could Grayson use cognitive behavioural therapy to help both his specific phobia and sleep issues? (3 MARKS)
- b. If Grayson is having trouble falling asleep, how may this impact his friendship with his roommate? (2 MARKS)

Chapter 9 Review

Chapter summary

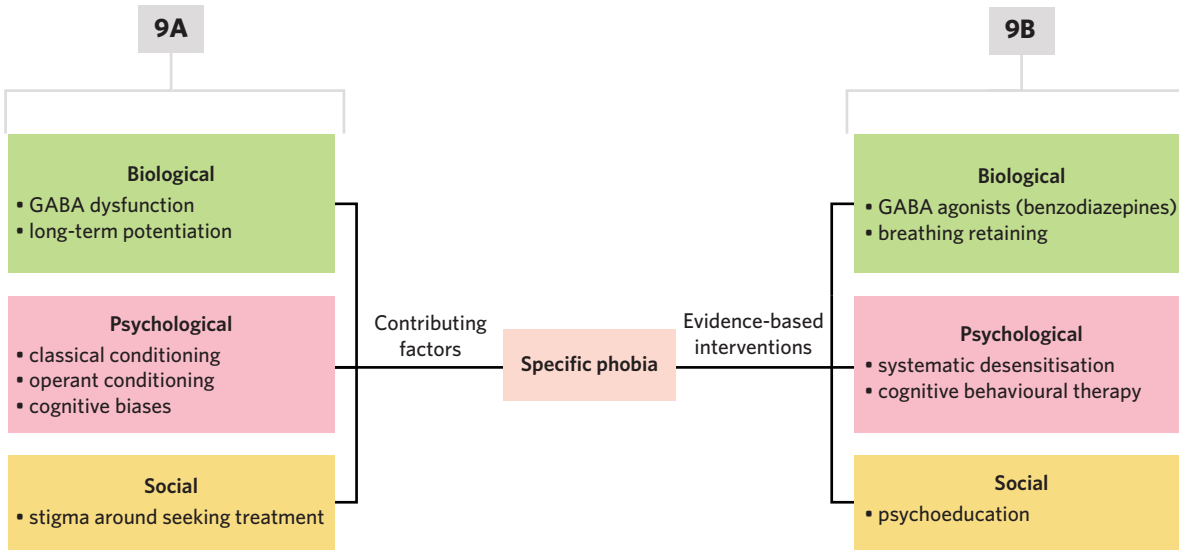
This chapter was all about using a biopsychosocial approach to understand specific phobias. You learnt about contributing factors to the development of specific phobias and interventions that can be used to manage specific phobias.

In lesson **9A Specific phobia and its contributing factors**, you learnt about the biological, psychological, and social factors that can contribute to the development of specific phobias. In particular, you learnt about the following factors:

- biological factors, such as
 - GABA dysfunction
 - long-term potentiation.
- psychological factors, such as
 - precipitation by classical conditioning
 - perpetuation by operant conditioning
 - cognitive biases, including memory bias and catastrophic thinking.
- social factors, such as
 - specific environmental triggers
 - stigma around seeking treatment.

In lesson **9B Evidence-based interventions for specific phobia**, you learnt about the biological, psychological, and social evidence-based interventions that can be used to manage specific phobias. In particular, you learnt about the following interventions:

- biological interventions, such as
 - GABA agonists, referred to as benzodiazepines
 - breathing retraining.
- psychological interventions, such as
 - cognitive behavioural therapy (CBT)
 - systematic desensitisation.
- social interventions, such as psychoeducation.



Chapter review activities

Review activity 1: Key terms

Fill in the table with appropriate descriptions for the key terms learnt in chapter 9.

| Factor | Description |
|--|-------------|
| The biopsychosocial approach | |
| Biological factors (in relation to specific phobia) | |
| Psychological factors (in relation to specific phobia) | |
| Social factors (in relation to specific phobia) | |
| Specific phobia | |
| GABA | |
| GABA dysfunction | |
| Long-term potentiation | |
| Precipitating factors | |
| Perpetuating factors | |
| Cognitive biases | |
| Memory bias | |
| Catastrophic thinking | |
| Specific environmental triggers | |
| Stigma | |
| Agonists | |
| Benzodiazepines | |
| Cognitive behavioural therapy | |
| Systematic desensitisation | |
| Psychoeducation | |

Review activity 2: Develop a case study

This chapter was all about application. Specifically, it focused on applying the biopsychosocial approach to specific phobia in terms of its contributing factors and evidence-based interventions. In this activity, develop a case study about an individual with specific phobia. You should centre your response on one individual and provide details about each element of the biopsychosocial approach to their specific phobia. You can fill in the following table in dot points or full sentences. Alternatively, you can write your own paragraph outlining your case study. The table provides some basic examples to help you understand the activity, however, ensure that your scenario is different to the examples provided.

| | Things to consider | Example | Details for your scenario |
|--|--|--|---------------------------|
| Specific phobia | What specific phobia does the individual have? | Tom has a specific phobia of snakes. | |
| Biological contributing factors | Are there any biological factors that have contributed to the development of the individual's specific phobia? How did these factors contribute? | Tom's fear pathway in his brain is strengthened when he encounters snakes. This reflects long-term potentiation as Tom's neural connections between fear and snakes are strengthened due to them being repeatedly coactivated. | Continues ► |

| | Things to consider | Example | Details for your scenario |
|---|---|---|---------------------------|
| Psychological contributing factors | Are there any psychological factors that have contributed to the development of the individual's specific phobia? How did these factors contribute? | Tom thinks that anything related to snakes is dangerous, including photos of snakes or toy snakes. He thinks all snakes will kill him. This is an example of catastrophic thinking as a cognitive bias for Tom. | |
| Social contributing factors | Are there any social factors that have contributed to the development of the individual's specific phobia? How did these factors contribute? | Tom had a traumatic experience when he was young with snakes, in which he was bitten by a snake. | |
| Biological evidence-based interventions | How could biological evidence-based interventions could be used to manage the individual's specific phobia? | Tom could use breathing retraining to help reduce physiological arousal when encountering snakes or anything related to snakes. | |
| Psychological evidence-based interventions | How could psychological evidence-based interventions be used to manage the individual's specific phobia? | Tom could use cognitive behavioural therapy, which would involve Tom substituting dysfunctional cognitions and behaviours with more adaptive ones. | |
| Social evidence-based interventions | How could social evidence-based interventions be used to manage the individual's specific phobia? | Tom's family could engage in psychoeducation to learn to not encourage avoidant behaviours and to challenge Tom's unrealistic thoughts about snakes. | |

Chapter 9 test

Multiple choice

Use the following information to answer questions 1-3.

When Noah was little, he watched a scary documentary about thunderstorms and lightning and was particularly traumatised by what he saw. He now has a phobia of thunderstorms.

Question 1 (1 MARK)

The scary documentary about thunderstorms and lightning was for Noah likely a

- A. cognitive bias.
- B. specific environmental trigger.
- C. classically conditioned fear.
- D. memory bias.

Question 2 (1 MARK)

Whenever Noah hears thunder, he thinks that a violent storm will occur and that lightning or flooding might kill him. In this situation, Noah's fears are an example of

- A. memory bias which is a physiological contributing factor.
- B. GABA dysfunction which is a social contributing factor.
- C. catastrophic thinking which is a psychological contributing factor.
- D. precipitation by classical conditioning which is a psychological contributing factor.

Question 3 (1 MARK)

Which of the following could Noah use to help manage his fear?

- A. Cognitive behavioural therapy.
- B. Long-term potentiation.
- C. Cognitive biases.
- D. Avoidance of thunderstorms.

Question 4 (1 MARK)

A biological factor contributing to phobias is

- A. stigma around seeking treatment.
- B. GABA dysfunction.
- C. specific environmental triggers.
- D. precipitation by classical conditioning.

Use the following information to answer questions 5–7.

Little Albert was an 11-month-old baby who was classically conditioned in an experiment to develop a fear response to white rats. This occurred through the repeated pairing of the presentation of a white rat and a loud noise. This fear response led to the development of a specific phobia towards white fluffy objects for Little Albert.

Question 5 (1 MARK)

In the development of Little Albert's phobia, the unconditioned stimulus and conditioned response were respectively

- A. the loud noise and fear of the white rat.
- B. the white rat and fear of the white rat.
- C. the loud noise and fear of the loud noise.
- D. the white rat and fear of the loud noise.

Question 6 (1 MARK)

In terms of neural plasticity, Little Albert's phobic response was likely perpetuated by

- A. the stress response.
- B. long-term potentiation.
- C. long-term depression.
- D. GABA dysfunction.

Adapted from VCAA Psychology 2018 exam Q9

Question 7 (1 MARK)

Which of the following best describes systematic desensitisation as a suitable evidence-based intervention for Little Albert?

- A. Gradual exposure to white rats.
- B. Avoidant exposure to white rats.
- C. Immediate exposure to white rats.
- D. Inconsistent exposure to white rats.

Question 8 (1 MARK)

Long-term potentiation can be considered a biological contributing factor to phobia when

- A. the co-activation of neural signals involved in activating the fear response and the perception of a stimulus strengthens their association.
- B. the co-activation of neural signals involved in activating the fear response and the perception of a stimulus weakens their association.
- C. the neural signals involved in activating the fear response are strengthened more than the neural signals involved in perceiving a certain stimulus.
- D. the neural signals involved in perceiving a certain stimulus are strengthened more than the neural signals involved in activating the fear response.

Short answer**Question 9** (2 MARKS)

Identify and describe one psychological factor contributing to specific phobias.

Question 10 (9 MARKS)

Dylan has a phobia of fish. He loves to swim but thinks that the moment he steps in the water, he will embarrass himself by yelling and screaming in fear of any fish he might touch.

- a. Explain a biological factor that could be contributing to Dylan's phobia of fish. (3 MARKS)
- b. Describe how the cognitive component of cognitive behavioural therapy (CBT) could be used to help Dylan reduce his catastrophic thinking about fish. (3 MARKS)
- c. With reference to psychoeducation, suggest how Dylan's family and friends could help his phobia of fish. (3 MARKS)

Question 11 (7 MARKS)

When Coen was younger, he had an angry cat in his family that often bit and scratched him. Over time, the association between his cat and pain grew stronger, and he acquired a phobic response to all cats. Now, as a teenager, Coen finds his fear embarrassing and frustrating as it impacts his everyday life. Working with a therapist, Coen is attempting to use systematic desensitisation to get over his fear of cats.

- a. In terms of classical conditioning, how will systematic desensitisation work to eliminate Coen's fear response? (3 MARKS)
- b. Explain how a benzodiazepine could be used to manage Coen's phobia of cats. (2 MARKS)
- c. What barriers may Coen have faced when working with a therapist to get over his fear of cats. (2 MARKS)

Question 12 (10 MARKS)

Seth is a teenager in year nine at high school and has had a specific phobia of tattoos since he was a very young child. Seth vaguely recalls when he was younger being yelled at by a stranger with many tattoos. As he grew up, Seth's fear of tattoos became increasingly worse. Seth began experiencing extreme fear when he saw anything related to tattoos, including seeing someone with tattoos, walking past a tattoo parlour, seeing photos of tattoos, or even talking about tattoos. Because of this, Seth would rarely leave his house and he would avoid many movies, television shows, and books, as he feared he may be exposed to tattoos. Although this meant he did not experience a fear response often, his daily functioning was severely impaired as he was not able to attend school, form relationships, or be part of society. Seth's parents have been very worried about him as his life is controlled by his fear of tattoos, and therefore, they have tried to get him to see a psychologist but Seth feels embarrassed by his fear, as many teenagers think tattoos are cool and trendy, and therefore he thinks he is 'strange' and 'odd'. After a bit of time, Seth agreed with his parents and began seeing a psychologist, who suggested that his interaction with the stranger as a child may have influenced the development of his tattoo phobia. Seth's long-term goal is to be able to go back to school and graduate in year 12.

Analyse Seth's experience of specific phobia in relation to the biopsychosocial approach. In your response, refer to both contributing factors and evidence-based interventions for specific phobia.

10



CHAPTER 10

Maintenance of mental wellbeing

LESSONS

- 10A** Biopsychosocial approach: Protective factors for mental wellbeing
- 10B** Cultural determinants of wellbeing for Aboriginal and Torres Strait Islander peoples

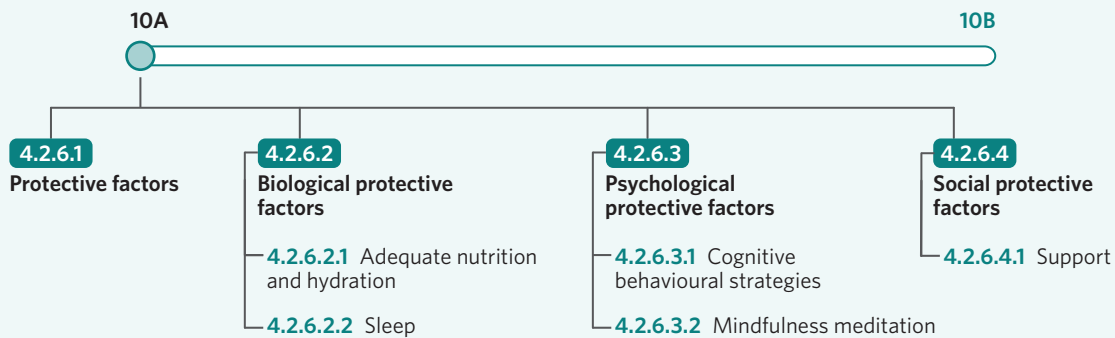
KEY KNOWLEDGE

- the application of a biopsychosocial approach to maintaining mental wellbeing, with reference to protective factors including adequate nutritional intake and hydration and sleep (biological), cognitive behavioural strategies and mindfulness meditation (psychological) and support from family, friends and community that is authentic and energising (social)
- cultural determinants, including cultural continuity and self-determination, as integral for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples

10A Biopsychosocial approach: Protective factors for mental wellbeing

STUDY DESIGN DOT POINT

- the application of a biopsychosocial approach to maintaining mental wellbeing, with reference to protective factors including adequate nutritional intake and hydration and sleep (biological), cognitive behavioural strategies and mindfulness meditation (psychological) and support from family, friends and community that is authentic and energising (social)



People commonly assume that talking therapy is the only option to manage mental wellbeing. While therapy can be an effective option, high levels of mental wellbeing are best maintained via a holistic and combined approach. In this lesson, you will apply the biopsychosocial approach to mental wellbeing. Specifically, you will learn about biological, psychological, and social protective factors for mental wellbeing.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Mental wellbeing

an individual's psychological state, including their ability to think, process information, and regulate emotions

Protective factors

influences that enable an individual to promote and maintain high levels of mental wellbeing

Protective factors 4.2.6.1

Before learning about specific biological, psychological, and social protective factors, it is important to understand what protective factors actually are. Therefore, in this section of the lesson, you will learn about protective factors.

Theory details

As you have learnt, **mental wellbeing** is an individual's psychological state, including their ability to think, process information, and regulate emotions. **Protective factors** are influences that enable an individual to promote and maintain high levels of mental wellbeing. Protective factors can be utilised by individuals as tools in their day-to-day lives to promote and maintain high levels of mental wellbeing. Protective factors can work in two ways by:

- reducing the risk of low levels of mental wellbeing or developing a mental health disorder
- increasing the likelihood of high levels of mental wellbeing.

Protective factors do not guarantee high levels of mental wellbeing, but rather they may help to improve an individual's mental wellbeing. Therefore, it is important to recognise that individual protective factors are not always a solution to managing low levels of mental wellbeing as further interventions and treatments may be required.

LESSON LINK

In lesson **9B Evidence-based interventions for specific phobia**, you learnt about the ways in which specific phobias can be effectively treated and managed. Protective factors are different from these evidence-based interventions as they do not work to treat a condition, but rather can act as helpful ways to maintain high or moderate levels of mental wellbeing in day-to-day life for most individuals.

Protective factors can be biological, psychological, or social. In this way, the biopsychosocial approach can be applied to protective factors for mental wellbeing. As you have learnt, the biopsychosocial approach suggests that biological, psychological, and social influences interact with each other, are equally effective, and are best used together. Therefore, to maintain mental wellbeing, a combination of biopsychosocial protective factors is likely to be most effective. Figure 1 displays the biological, psychological, and social protective factors for mental wellbeing that will be taught in this lesson.

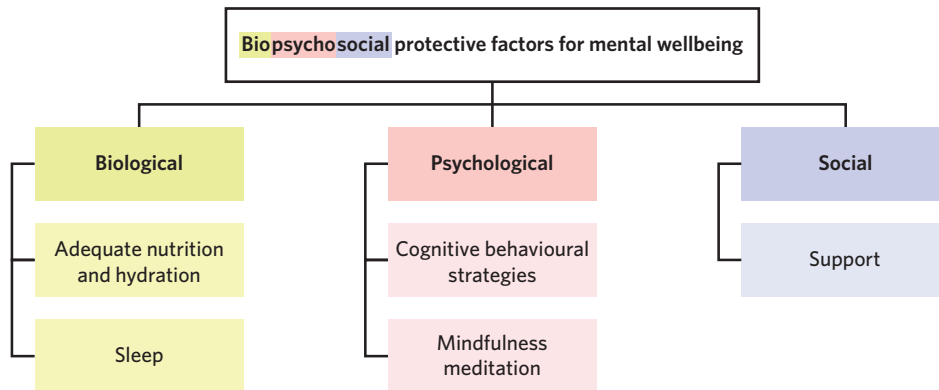


Figure 1 The biopsychosocial protective factors for mental wellbeing that you will learn about in this lesson

USEFUL TIP

In this lesson, the specific biopsychosocial factors that are taught will be discussed in a positive sense, as they are protective factors. However, these biopsychosocial factors can exist negatively in an individual's life, such as inadequate nutrition and hydration. In such a circumstance, these factors are not considered to be protective factors, but rather, can be risk factors that increase the risk of an individual experiencing low levels of mental wellbeing. Therefore, it is important to always use language that presents the factors in a positive sense when referencing protective factors.

LESSON LINK

In lesson **8A Ways of considering mental wellbeing**, you learnt about functioning, resilience, and social and emotional wellbeing as considerations of mental wellbeing. Because protective factors promote mental wellbeing, they also promote functioning, resilience, and social and emotional wellbeing. Furthermore, in lesson **8B Mental wellbeing as a continuum**, you learnt about how mental wellbeing fluctuates across a continuum. Protective factors can help keep mental wellbeing levels high on the continuum.

Biological protective factors 4.2.6.2

In this section of the lesson, you will learn about biological protective factors for mental wellbeing.

Theory details

Biological protective factors refer to influences that stem from an individual's brain and/or body that can maintain or promote mental wellbeing. Adequate nutrition and hydration, as well as sleep, are two biological protective factors, which you will learn about in this lesson.

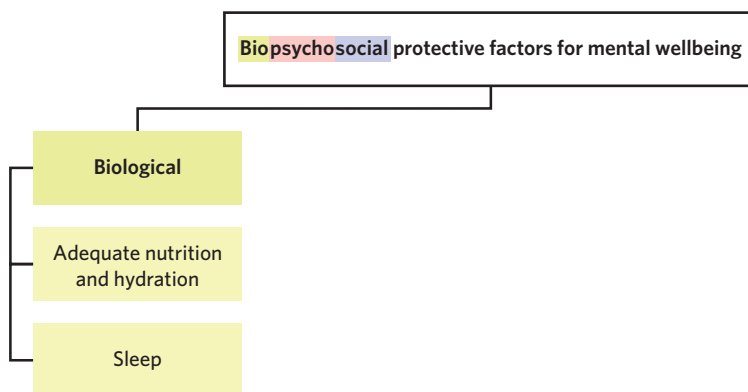


Figure 2 Biological protective factors discussed in this lesson

Biological protective factors (in relation to mental wellbeing) influences that stem from an individual's brain and/or body that can maintain or promote mental wellbeing

Adequate nutrition and hydration when the type and amount of food and drink that an individual consumes meet their physical needs

Adequate nutrition and hydration 4.2.6.2.1

Adequate nutrition and hydration is when the type and amount of food and drink that an individual consumes meet their physical needs. This can include ensuring that an individual has sufficient water, carbohydrate, protein, fat, vitamin, and mineral intake.

Research suggests that adequate nutrition and hydration can promote mental wellbeing (Firth et al., 2020; Owen & Corfe, 2017). In terms of nutrition, research tends to indicate that a Mediterranean-style diet, abundant in unprocessed foods, can promote mental wellbeing by reducing the risk of experiencing mental health disorders, such as depression and anxiety. In contrast, a Western-style diet, consisting of processed foods and lacking vital nutrients, can impair mental wellbeing by increasing the risk of experiencing mental health disorders (Dog, 2010).

A Mediterranean diet often has high amounts of:

- fruits
- vegetables
- legumes
- nuts and seeds.

A Western diet often has high amounts of:

- highly processed foods
- alcohol
- added sugar, salt, and saturated and trans fats.

In terms of hydration, it is recommended that individuals drink 2–3 litres of water per day (although this is dependent on individual characteristics, such as body weight and sex) for optimal physiological functioning. Research has suggested that drinking enough water is beneficial for mental wellbeing (Haghighatdoost et al., 2018).

PSYCHOLOGY EXPLORATION

The relationship between nutrition and mental wellbeing is continuously evolving. There is much research exploring the large influence of nutrition on the presence or absence of a mental health disorder. Many studies explore the Mediterranean diet in further detail. For example, specific foods in the Mediterranean diet help to reduce inflammation in the body, which is linked to higher levels of mental wellbeing. Additionally, specific nutrients have been shown to improve mental wellbeing. (Bayes et al., 2020; Sanchez-Villegas et al., 2006)

Ultimately, having adequate nutrition and hydration can act as a protective factor for mental wellbeing. By prioritising the consumption of unprocessed foods, adequate nutritional intake, and sufficient water intake, the risk of mental health disorders can be reduced, thus promoting higher levels of mental wellbeing.

Sleep 4.2.6.2.2

Sleep a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli

As you have learnt, **sleep** is a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli. Adequate sleep is important for mental wellbeing. Research suggests there is a link between poor sleep (sleep deprivation and/or sleep-related problems) and mental illness (Pigeon et al., 2017; Scott et al., 2017). Good sleep is likely to reduce the likelihood of mental health disorders and promote mental wellbeing, therefore acting as a protective factor.

Both adequate nutrition and hydration, as well as sleep, have a bidirectional relationship with mental wellbeing. This means that while nutrition and sleep can influence mental wellbeing, mental wellbeing can influence nutrition and sleep. For example, as you have learnt, adequate nutrition and hydration can be a protective factor for depression, however, depression can also impair an individual's appetite, meaning it may be more challenging for a depressed individual to have adequate nutrition and hydration.

LESSON LINK

In lesson **7C Improving sleep**, you learnt about sleep hygiene as a necessity for mental wellbeing. This confirms that sleep is a protective factor for mental wellbeing, as having an adequate quantity and quality of sleep is beneficial for an individual's mental wellbeing.

Psychological protective factors 4.2.6.3

In this section of the lesson, you will learn about psychological protective factors for mental wellbeing.

Theory details

Psychological protective factors refer to influences that relate to mental processes that can maintain and promote mental wellbeing. Cognitive behavioural strategies and mindfulness meditation are two psychological protective factors, which you will learn about in this lesson.

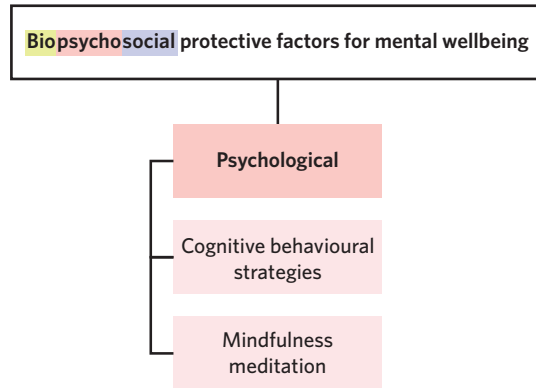


Figure 3 Psychological protective factors discussed in this lesson

Psychological protective factors (in relation to mental wellbeing) influences that relate to mental processes that can maintain and promote mental wellbeing

Cognitive behavioural strategies techniques that utilise traits of cognitive behavioural therapy, particularly recognising and changing dysfunctional thought and behavioural patterns

Cognitive behavioural strategies 4.2.6.3.1

Cognitive behavioural strategies are techniques that utilise traits of cognitive behavioural therapy, particularly recognising and changing dysfunctional thought and behavioural patterns. In this way, cognitive behavioural strategies can be used to promote mental wellbeing by acknowledging and changing thoughts and behaviours that impair mental wellbeing.

Cognitive behavioural therapy involves a cognitive and a behavioural component.

- The cognitive component involves:
 - identifying dysfunctional feelings and thoughts (cognitions) about the issue.
 - replacing these dysfunctional feelings and thoughts with more functional ones.
- The behavioural component involves:
 - identifying dysfunctional behaviours relating to the issue.
 - developing and maintaining more functional behaviours relating to the issue.

Figure 4 presents an example of cognitive behavioural therapy being used to promote mental wellbeing.

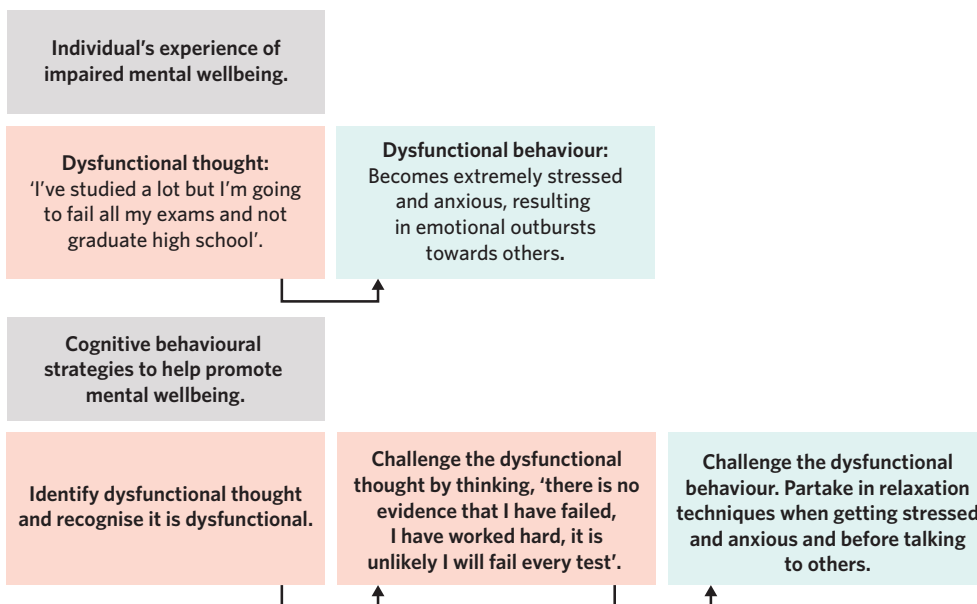


Figure 4 Cognitive behavioural strategies and mental wellbeing

Mindfulness meditation the practice of meditation in which an individual focuses on their present experience to promote feelings of calm and peace

Mindfulness meditation 4.2.6.3.2

Mindfulness meditation is the practice of meditation in which an individual focuses on their present experience to promote feelings of calm and peace. Mindfulness meditation is a specific type of meditation that encourages an individual to pay attention to the present moment, including their current feelings, thoughts, and surroundings. Additionally, mindfulness meditation requires an individual to observe their present experience with kindness and without judgement. Mindfulness meditation can be practised by sitting comfortably and focusing attention on your senses. Furthermore, research suggests that mindfulness meditation can benefit mental wellbeing (Eberth et al., 2012). In particular, mindfulness meditation can:

- improve emotional reactivity
- reduce the likelihood of rumination (repeatedly considering negative thoughts)
- reduce stress
- improve memory (Davis et al., 2012).

LESSON LINK
 In lesson **8B Mental wellbeing as a continuum**, you learnt about anxiety. Anxiety is characterised by worry about the future. In this way, mindfulness meditation can be particularly effective for those with anxiety as it focuses an individual's attention away from the future and to the present moment.

Social protective factors 4.2.6.4

In this section of the lesson, you will learn about social protective factors for mental wellbeing.

Theory details

Social protective factors refer to influences that exist in an individual's social environment that can maintain and promote mental wellbeing. Support is an example of a social protective factor, which you will learn about in this lesson.

Social protective factors (in relation to mental wellbeing) influences that exist in an individual's social environment that can maintain and promote mental wellbeing
Support genuine and effective assistance provided by family, friends, and community

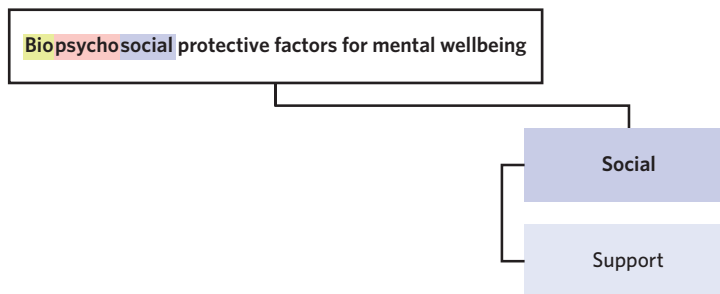


Figure 5 Social protective factors discussed in this lesson

Support 4.2.6.4.1

Support refers to genuine and effective assistance provided by family, friends, and community. Support can provide comfort and reassurance and can encourage individuals to develop different strategies to promote their mental wellbeing. In order for support to be effective in promoting mental wellbeing, it is important to ensure that it is authentic and energising. This means ensuring that the support being provided:

- genuinely aims to promote mental wellbeing
- is focused on creating an environment that is likely to improve mental wellbeing
- uses legitimate and effective advice.

Table 1 explores examples of support provided by family, friends, and the community.

Table 1 Examples of support from family, friends, and the community

| Examples of support | |
|---------------------|---|
| Family | <ul style="list-style-type: none"> • Unconditional love when an individual makes a mistake • Regular catch-ups to vent emotions and share life details • Familiar perspectives to go back to in times of uncertainty • Support in difficult times, both emotionally and practically • A sense of belonging to a relatively static and familiar group • Encouragement to change and avoid unhealthy behaviours |
| Friends | <ul style="list-style-type: none"> • Fun and energising experiences • Levels of intimacy and closeness that a person might not have with their family • Support in difficult times, for example through providing distractions from difficult emotions, or assistance with self-care • Reduction of stress and an increase in happiness • A sense of belonging • A sense of purpose |
| Community | <ul style="list-style-type: none"> • Opportunities for interaction and bonding, such as at clubs for specific interests or at events like festivals • A sense of belonging and connectedness to a wider social circle • A sense of moral accomplishment, achieved by participation in collaborative community projects • Opportunities for personal growth and learning, such as at workshops and clubs • Facilities and services for support, such as financial and medical assistance, or support for psychological difficulties, such as groups for parenting or overcoming grief |

Theory summary

In this lesson, you learnt about biopsychosocial protective factors for mental wellbeing. These include:

- biological protective factors, such as adequate nutrition and hydration and sleep
- psychological protective factors, such as cognitive behavioural strategies and mindfulness meditation
- social protective factors, such as support.

10A Questions

Theory review

Question 1

Protective factors can reduce the risk of developing a mental health disorder.

- A. True.
B. False.

Question 2

According to the biopsychosocial model, biological protective factors are more effective than social protective factors.

- A. True.
B. False.

Question 3

Mental wellbeing can be protected by which of the following? **(Select all that apply)**

- I. Adequate nutrition.
- II. Adequate hydration.
- III. Support from family, friends, and community.

Question 4

If someone practices mindfulness meditation every day, they will never experience low levels of mental wellbeing.

- A. True.
- B. False.

Assessment skills

Data analysis

The following assessment skills type reflects the study design assessment type:

- analysis and evaluation of generated primary and/or collated secondary data

Use the following information to answer questions 5-9.

A study was conducted to gather information on the effectiveness of cognitive behavioural therapy for individuals with a mental health disorder. The study involved participants with post-traumatic stress disorder and another diagnosed mental health disorder engaging in a 12-16 week cognitive behavioural therapy course.

The Clinical Administered PTSD* Scale (CAPS) assessment was used to measure the effectiveness of the treatment. The CAPS test provides an indication of PTSD severity. A higher score on the CAPS test indicates higher severity of symptoms, while a lower score on the CAPS test indicates lower severity of symptoms.

All participants completed the CAPS assessment before, directly after, and three months after treatment (the long-term follow-up score).

The following table presents the results.

Pre-treatment, post-treatment, and follow-up CAPS scores for clients who completed CBT program

| Participant # | Pre-treatment CAPS score | Post-treatment CAPS score | Long-term follow up CAPS score |
|---------------------------------|--------------------------|---------------------------|--------------------------------|
| 1 | 48 | 44 | 30 |
| 2 | 57 | 31 | 44 |
| 3 | 92 | Unrecorded | 80 |
| 4 | 66 | 48* | 36 |
| 5 | 54 | 65 | 30 |
| 6 | 75 | 48 | 67 |
| 7 | 57 | 8 | 9 |
| 8 | 45 | 39 | 34 |
| 9 | 91 | 75 | 65 |
| 10 | 66 | 63 | 11 |
| 11 | 92 | 71 | 89 |
| 12 | 104 | 92 | 86 |
| Total Mean (SD) | 71 (19.82) | 53 (20.26) | 48 (28.11) |
| Meets the criteria for PTSD (%) | 12 (100) | 7 (64) | 6 (50) |

*PTSD stands for Post-Traumatic Stress Disorder
(Rosenberg et al., 2010)

Question 5

What might the total mean of the results suggest?

- A. The CBT program showed improvements in the post-treatment CAPS score and the long-term follow-up CAPS score.
- B. The CBT program showed improvements in the post-treatment CAPS score but not the long-term follow-up CAPS score.
- C. The CBT program did not show improvements in the post-treatment CAPS score but did show improvements in the long-term follow-up CAPS score.

Question 6

Participant 2 had a pre-treatment score of 57, a post-treatment score of 31, and a long-term follow-up score of 44. What may this suggest about the CBT program?

- A. The CBT program is effective immediately after treatment and effective in the long-term.
- B. The CBT program is less effective in the long-term compared to immediately after treatment.
- C. The CBT program is not effective immediately after treatment.

Question 7

What type of data was collected in this study?

- A. Qualitative.
- B. Quantitative.
- C. Random.
- D. Convenience.

Question 8

The percentage of participants who meet the criteria for PTSD

- A. decreased from the pre-treatment to post-treatment, but increased in the long-term follow up.
- B. increased from the pre-treatment to post-treatment, but decreased in the long-term follow up.
- C. did not change.
- D. decreased from the pre-treatment to post-treatment, and to long-term follow up.

Question 9

Which of the following is **not** true about the data?

- A. At the conclusion of the study, 50% of participants met the criteria for PTSD.
- B. Overall, the CBT program appeared to be effective for the participants.
- C. Post-treatment scores for all participants were lower than pre-treatment scores.
- D. The mean post-treatment score on the CAPS assessment was 53.

Exam-style**Remember and understand****Question 10** (1 MARK)

One social protective factor which may maintain mental wellbeing is

- A. the use of cognitive and behavioural strategies.
- B. accessing support from family and friends.
- C. the consumption of healthy food.
- D. avoiding going out to get adequate sleep.

Question 11 (1 MARK)

Outline what protective factors for mental wellbeing are.

Question 12 (2 MARKS)

Explain how one psychological protective factor could promote a person's mental wellbeing.

Apply and analyse**Question 13** (1 MARK)

Lydia has been struggling with her mental wellbeing as she has taken up a new and stressful job, and is also trying to balance this with being a mother. Lydia has been talking to her doctor about how to manage her mental wellbeing to ensure it doesn't get too low. To try and improve Lydia's mental wellbeing, her doctor decided to take a biopsychosocial approach.

Which of the following best outlines a biological, psychological, and social factor that could promote Lydia's mental wellbeing?

| | Biological | Psychological | Social |
|----|---|---|--|
| A. | Using cognitive behavioural strategies to change her brain's thinking patterns. | Going to talk therapy with a psychologist. | Accessing support from her family and friends. |
| B. | Taking medication to treat Lydia's mental illness. | Accessing support from her family and friends. | Engaging with the community. |
| C. | Improving Lydia's nutrition and hydration to ensure that she consumes adequate nutrients. | Practising mindfulness meditation. | Accessing support from her family and friends. |
| D. | Improving Lydia's nutrition and hydration to ensure that she consumes adequate nutrients. | Using systematic desensitisation to ease her anxious thinking patterns. | Increasing her social activity. |

Adapted from VCAA Psychology exam 2020 Q44

Question 14 (3 MARKS)

Pim is a high school student and has often had high levels of mental wellbeing, usually only experiencing small amounts of stress and anxiety around busy assessment times at school. However, recently Pim's grandfather has been diagnosed with cancer, which has been very upsetting for Pim and his family. Pim's grandfather is undergoing treatment, which, despite being a lengthy process, is likely to be successful.

Using the biopsychosocial approach, suggest how Pim and his family could maintain their levels of mental wellbeing despite his current situation.

Questions from multiple lessons**Question 15** (7 MARKS)

Athena recently had a dance recital coming up and was very stressed and anxious. She worried that she would not perform well enough and that she would let everyone in her team down. Despite this, Athena managed to complete her dance recital well. A few days after Athena's recital she developed a nasty cough. She has been in bed for a few days sick and is feeling very hopeless about getting better.

- Suggest where Athena would be placed on the mental health continuum prior to her dance recital. (2 MARKS)
- Explain how Athena could have used one protective factor to help her cope with the stress and anxiety of her dance recital. (2 MARKS)
- Referring to a psychological model, explain why Athena has become sick after her dance recital. (3 MARKS)

10B Cultural determinants of wellbeing for Aboriginal and Torres Strait Islander peoples

STUDY DESIGN DOT POINT

- cultural determinants, including cultural continuity and self-determination, as integral for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples

10A

10B

4.2.7.1

Cultural determinants of wellbeing

4.2.7.1.1 Cultural continuity

4.2.7.1.2 Self-determination

While speaking at the Healing Foundation public forum, Professor Michael Chandler said that 'cultural wounds require cultural medicine' (The Lowitja Institute, 2014). This quote reflects that, for First Nations peoples, engagement with culture has a vastly positive impact on wellbeing. This is especially true as many Aboriginal and Torres Strait Islander peoples are still working towards healing from generational disconnection from culture as a result of colonisation. So far in this chapter, you have explored protective factors that promote positive mental wellbeing. This lesson will explore what is meant by cultural determinants of wellbeing, and explore the centrality of cultural continuity and self-determination as integral for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples.



Image: ChameleonsEye/Shutterstock.com

Cultural determinants of wellbeing 4.2.7.1

Before we delve into specific examples of cultural determinants, it is important to understand what 'cultural determinants of wellbeing' actually are. This section of the lesson will explore how cultural determinants act as a protective factor for wellbeing for Aboriginal and Torres Strait Islander peoples.

Theory details

Determinants of wellbeing refer to factors that influence wellbeing on individual and community levels. There are many determinants of wellbeing, ranging from influences in the physical environment to economic factors. Culture is considered to be an important determinant of wellbeing. For Aboriginal and Torres Strait Islander peoples, **culture** can be understood as encompassing a strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs.

The Lowitja Institute explains that, for Aboriginal and Torres Strait Islander peoples, 'culture is about the life-giving values from which individuals, families, and communities can draw strength, resilience, and empowerment, thus contributing to health and wellbeing' (2014, p.2). As such, it is a way of life that is shared and learned (Verbunt et al., 2021).

Considering that cultural connectedness and knowledge are vital components of health and wellbeing (Kingsley et al. 2018), cultural determinants are acknowledged as having a significant impact on wellbeing for Aboriginal and Torres Strait Islander peoples.

In this lesson, you will focus on two important cultural determinants of wellbeing, including:

- cultural continuity
- self-determination.

ACTIVITY

Log into your Edrolo account for activities that support this lesson.

KEY TERMS

Determinants of wellbeing factors that influence wellbeing on individual and community levels

Culture a strong sense of identity, values, tradition, and connection between the past, present and future that drives behaviour and beliefs

LESSON LINK

In lesson **10A Biopsychosocial approach: Protective factors for mental wellbeing**, you learnt about biological, psychological, and social protective factors that help individuals maintain high levels of mental wellbeing. Determinants of wellbeing can act as protective factors, and cultural determinants of wellbeing specifically are considered to be social factors.

Cultural continuity
the passing down and active practice of cultural knowledge, traditions, and values from generation to generation

LESSON LINK

In lesson **5D Mnemonics**, you learnt about Aboriginal and Torres Strait Islander communities' use of Songlines and sung narratives. Learning about and engaging with these cultural expressions is a very important aspect of cultural continuity as they enable the passing down and active practice of cultural knowledge.

A variety of other cultural determinants of wellbeing are outlined in figure 1.

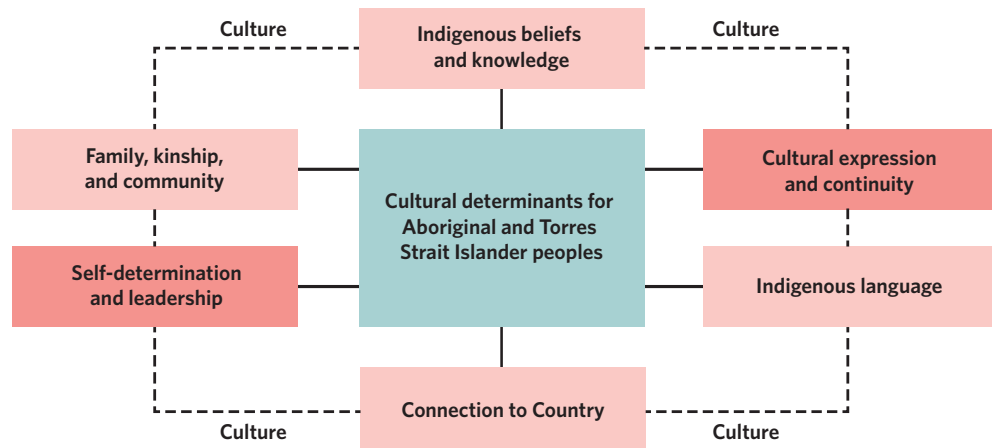


Figure 1 Cultural determinants of wellbeing for Aboriginal and Torres Strait Islander communities

Cultural continuity 4.2.7.1.1

Do you have a particular tradition, religious, or cultural practice that you celebrate with your family? Perhaps it is a certain way you celebrate life events (like marriage), or a certain age at which you are considered an adult. Do you know where this tradition came from?

If you aren't sure, chances are it is because you are one person in a series of generations that have celebrated this milestone or practice in this way. This is known as **cultural continuity**, which refers to the passing down and active practice of cultural knowledge, traditions, and values from generation to generation. Cultural continuity can be achieved through a variety of cultural practices, including engaging with arts, crafts, music, dance, theatre, writing, storytelling, languages, food, and so much more.

Cultural continuity can be disrupted or destroyed if cultural practices are not allowed to continue. For Aboriginal and Torres Strait Islander peoples, this occurred with the arrival of the British first fleet in 1788 (Moreton-Robinson, 2015).

As noted by Professor Mick Dodson AM (Australian of the year, 2009), 'the lives of Indigenous Australians today are affected by what has happened to us and our ancestors over the past 230 years since Europeans arrived' (Reconciliation Australia, n.d.). In particular, as part of the British colonisation practices, assimilation and 'protection' policies saw many First Nations people violently separated from their families, and punished for speaking their languages or honouring their culture (futurelearn.com, n.d.). These policies were put in place in the early 1900s and continued until the 1970s. Many of these First Nations people, known as the Stolen Generations, and their descendants, are still working through the trauma and legacy of these colonisation policies (AIHW, 2019). As such, cultural continuity is a vital cultural determinant for the re-establishment and maintenance of wellbeing in Aboriginal and Torres Strait Islander communities, and Indigenous populations worldwide, as it enables communities to heal and form strong identities.

WANT TO KNOW MORE?

When people experience trauma, their experiences can also affect their children, grandchildren, and great-grandchildren. When communities and nations as a whole experience widespread trauma, this effect is pervasive and widespread. This is known as intergenerational trauma.

Reconciliation Australia (n.d.) explains that:

'When someone is traumatised by a difficult event, their life is often turned upside down by emotional 'wounds'. And if they are unable to heal those wounds themselves, they can pass them on to their children.

Many generations of Aboriginal and Torres Strait Islander peoples around the nation have been affected by traumatic events in the last 100–200 years. These experiences have included war in the earlier years as they tried to defend their country, or continue to live on it; widespread death from disease; slavery; forced removal from land; imprisonment (often for offences they didn't know they'd committed); being taken from their parents and families at a young age and held in institutions (where abuse of children was common); having their children taken from them and many other traumatic experiences.'

Continues ►

WANT TO KNOW MORE?

Understanding this context is vital to understanding why cultural determinants are integral for maintaining wellbeing in Aboriginal and Torres Strait Islander communities. As you read at the beginning of this lesson, 'cultural wounds require cultural medicine' (Professor Michael Chandler, in The Lowitja Institute, 2014).

To learn more about the history and strength of Indigenous communities, refer to the following sources:

- Reconciliation Australia's (n.d.) 'Share our Pride'. Type the following URL shareourpride.reconciliation.org.au/sections/our-shared-history/ into your browser.
- The Healing Foundation (2022). Type the following URL healingfoundation.org.au/ into your browser.
- SNAICC – National Voice for our Children (2022). A Peak Aboriginal Organisation advocating for the rights of Aboriginal and Torres Strait Islander children, youth, and families. Type the following URL snaicc.org.au/ into your browser.

PSYCHOLOGY EXPLORATION

Language as a means of cultural continuity

Aboriginal and Torres Strait Islander communities continue to establish ways of ensuring cultural continuity is protected. One way in which this is occurring is through the establishment of language programs that enable young First Nations people to learn their mother tongues. This is because 'traditional languages are a key element of Indigenous peoples' identity, cultural expression, autonomy, spiritual and intellectual... wellbeing' (Sivak et al. 2019, p.1).

Leda Sivak, who has led a research team with Wardliparingga, an Aboriginal health equity research unit, sought to uncover the benefits of language reclamation for the wellbeing of First Nations peoples and communities. She and her team (Sivak et al., 2019) note that:

- the process of colonisation involved destroying language by separating people from their families and preventing them from speaking their languages.
- in the years that have followed, the further decline of Aboriginal and Torres Strait Islander languages has negatively impacted the wellbeing of Indigenous peoples over time.
- there is an 'overwhelming desire among Australian Indigenous communities to reclaim their traditional languages because of the... impact on cultural renewal, cultural identity, and wellbeing' (p.2).

The implementation of language programs, especially for young students studying at school, has been acknowledged as being a genuine way to increase awareness and understanding of Aboriginal cultures and celebrate their rich histories (VAEAI, n.d.). The VCE Aboriginal Languages of Victoria study design for 2023-2027 (p.6) reminds us that:

'This loss of language heritage is a direct result of contact with English. Language displacement and loss have particularly affected Victoria and Tasmania where Aboriginal languages are no longer spoken as the primary means of communication. Even so, most Aboriginal Victorians are aware of their language heritage, although some may recall only fragments of the language passed down over several generations since English settlement. Aboriginal Victorians have maintained their oral traditions when and where they can, despite continual removal and displacement. These oral traditions constitute the most important body of knowledge of the languages.

As such, language is vital for facilitating cultural continuity and the promotion of positive wellbeing.'

Self-determination 4.2.7.1.2

Peter Dawson, a leading Indigenous law academic and human rights advocate, writes:

'For more than two centuries, our Elders and Ancestors have protected our right to self-determination. Ever since the tall ships arrived, each generation of Aboriginal and Torres Strait Islander people has reminded Australia that we are still here, our cultures still run through our veins, our languages still live on our tongues and we retain deep connections to our traditional lands and waters.' (Dawson, 2015, p.3)

The United Nations specifies that all nations have the right to **self-determination**, which refers to the rights of all peoples to pursue freely their economic, social, and cultural development without outside interference (for example, without the government of a country making it illegal to perform certain cultural practices). Self-determination is a very important cultural determinant of wellbeing.

Self-determination

the rights of all peoples to pursue freely their economic, social, and cultural development without outside interference

Self-determination requires that First Nations people are involved in ‘every layer of decision making’ (Behrendt et al., 2017), including decisions that impact communities, states, and the country as a whole. But what does this self-determination look like? Self-determination can include endeavours such as:

- Aboriginal community-controlled organisations.
- established partnerships between communities, governments, and non-government organisations, which is any not-for-profit organisation that exists to address a political or social issue.
- constitutional recognition for Aboriginal and Torres Strait Islander peoples. This will recognise Aboriginal and Torres Strait Islander peoples as the First Nations of Australia and empower Aboriginal and Torres Strait Islander peoples to determine their own futures (Dawson, 2015).

Autonomy (the ability to self-govern and make one’s own decisions) and independence are very important aspects of wellbeing for individuals because it enables individuals to feel in control over their own lives and live on their own terms. Likewise, self-determination is an integral factor for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples as it enables communities to protect what is most important to them on a wider scale.

WANT TO KNOW MORE?

Why are communities fighting for constitutional recognition?

In 1967, a referendum was held to change the constitution to enable Aboriginal and Torres Strait Islander people to be included in the census. However, this referendum did not recognise Aboriginal and Torres Strait Islander peoples as the first peoples of Australia and it did not remove the government’s right to make laws on behalf of communities based on race.

One example of how First Nations Australians are seeking constitutional recognition is the Uluru Statement from the Heart. The Uluru Statement calls for the establishment of a First Nations Voice to be enshrined in the Australian Constitution.

To understand more about the Uluru Statment from the Heart, search for ‘Megan Davis explains the Uluru Statement from the Heart’ on YouTube, and watch the 5-minute and 53-second video (NITV, 2022).

To understand more generally why communities continue to fight for constitutional recognition, check out the following resources:

- Type the URL humanrights.gov.au into your browser (Australian Human Rights Commission, n.d.).
- Search for ‘Behind the news what is constitutional recognition’ (Behind the News, 2019) on YouTube, and watch the 5-minute and 12-second video.

USEFUL TIP

Indigenous peoples are incredibly diverse. As such, what works for someone in terms of feeling connected to culture or enacting self-determination may not work for someone else. It is important to acknowledge that every individual is on their own journey, and there is no right or wrong way to achieve these cultural determinants of wellbeing.

WANT TO KNOW MORE?

Victorian Treaty

A treaty is an agreement between states, nations, or governments regarding how they will interact and how decisions will be made. Currently, there is a campaign to create a treaty between Victoria’s First Nations and the Victorian government in order to enable greater self-determination for Aboriginal communities.

‘Treaty is an opportunity to recognise and celebrate the unique status, right, cultures and histories of Traditional Owners and Aboriginal Victorians’ (Victorian Government, 2022).

The creation of treaties is politically significant, as they recognise the sovereignty of the people within a particular place. It is important to note that no treaty was in place at the time of the colonisation of Australia. The USA, Canada, and New Zealand all have treaties with their First Nations communities (Deadly Story, n.d.).

For more information, type the URL firstpeoplesrelations.vic.gov.au/treaty into your browser (State Government of Victoria, 2021).

Theory summary

In this lesson, you have learnt that cultural continuity and self-determination are cultural determinants that are integral to the maintenance of wellbeing for Aboriginal and Torres Strait Islander communities.

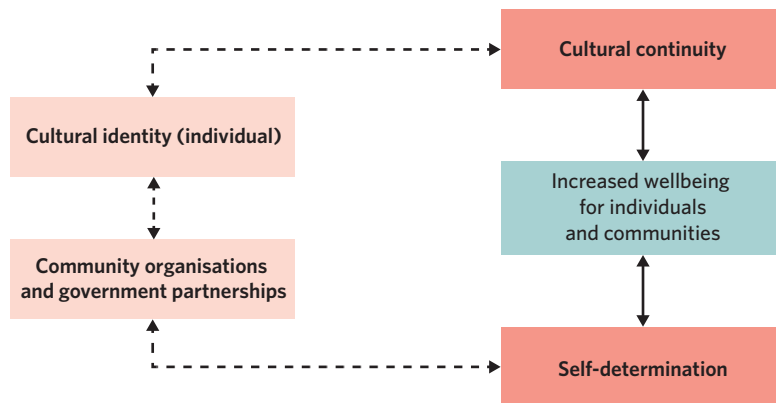


Figure 2 A summary of the cultural determinants of wellbeing explored in this lesson

10B Questions

Theory review

Question 1

Culture is not important in the maintenance of wellbeing for Aboriginal and Torres Strait Island peoples.

- A. True.
- B. False.

Question 2

Which of the following are examples of cultural determinants of wellbeing? **(Select all that apply)**

- I. Happiness.
- II. Freedom.
- III. Cultural continuity.
- IV. Self-determination.

Question 3

How can cultural continuity be maintained? **(Select all that apply)**

- I. Arts and crafts.
- II. Language.
- III. Theatre.

Question 4

How can self-determination be achieved by communities?

- A. Community-run organisations addressing their particular needs.
- B. By having every individual within the community make their own decisions independent of family and friends.
- C. Providing extra funding to government-run organisations.

Assessment skills

Perfect your phrasing

Question 5

Which of the following sentences is most correct?

- A. Cultural continuity refers to the passing down and active practice of cultural knowledge, traditions, and values from **person to person**.
- B. Cultural continuity refers to the passing down and active practice of cultural knowledge, traditions, and values from **generation to generation**.

Question 6

Which of the following sentences is most correct?

- A. Self-determination refers to the rights of **all** peoples to pursue freely their economic, social and cultural development without outside interference.
- B. Self-determination refers to the rights of **some** peoples to pursue freely their economic, social and cultural development without outside interference.

Text analysis

The following assessment skills type reflects the study design assessment type:

- media analysis of one or more contemporary media texts

Use the following information to answer questions 7-10.

Media text 1

Why self-determination is vital for Indigenous communities to beat Coronavirus

Having historically dealt with the challenge of infectious diseases being introduced from overseas, to which they have no immunity, the Aboriginal and Torres Strait Islander peoples were well prepared in combating the Coronavirus pandemic.

As noted by Walsh and Rademaker (2020), 'Historically, epidemics have brought a double threat: first to Indigenous health, then to Indigenous self-determination.'

Compared to the past, Indigenous people were more able to take measures to protect their communities from disease. Facing the threat of COVID-19, Indigenous communities rose to the challenge early, decisively and of their own initiative.

For example:

- Even when the prime minister still planned to attend footy matches, the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands Traditional Owners had the foresight to restrict access to their region in early March to avoid the spread of Coronavirus.
- Mapoon Aboriginal Shire implemented its own travel ban on March 24 whilst Australia's international travel ban began on March 25.
- Numerous land councils stopped issuing permits for visitors before the government actioned lockdowns.
- 'Return to Country' programs were implemented by Tangentyere Council and Larrakia Nation to cover the cost of people wishing to return to their communities.
- Indigenous communities produced their own educational material in multiple formats and in their own languages, such as the production of YouTube videos in 17 languages by the Northern Land Council.

(Walsh & Rademaker, 2020)

Media text 2**Beating Covid: How Aboriginal communities mobilised to fight the pandemic**

Although the discrepancies in the life expectancy and health status of First Nations people in Australia in part reflect the ongoing impact of centuries of alienation and marginalisation, the underlying health determinant has not been addressed, making First Peoples especially vulnerable to COVID-19. But incredibly, the health impact of the pandemic, so far, didn't mirror this vulnerability.

Given the poor health outcomes and huge health inequalities between Indigenous and non-Indigenous Australians, the country's network of Aboriginal health organisations took strong and pre-emptive action to stop the spread of the disease. They attempted to prevent the virus from spreading through direct engagement with federal and state governments, communication, and community action on the ground that included lockdowns.

This is a stunning example of what self-determination can achieve, even though First Peoples of Australia still lack a national representative body.

(Walsh & Rademaker, 2020)

Question 7

The action taken by the Indigenous peoples to combat the Coronavirus pandemic (in both Media texts 1 and 2) is an example of

- A. cultural continuity.
- B. self-determination.
- C. both A and B.
- D. neither A and B.

Question 8

In terms of cultural determinants, which of the following best summarises Media text 1?

- A. Indigenous communities had a better response to the Coronavirus pandemic than the Australian government.
- B. Self-determination enabled a proactive and effective response to the Coronavirus pandemic in Indigenous communities.
- C. Indigenous communities were less impacted by the Coronavirus pandemic than non-Indigenous communities.
- D. Cultural continuity enabled a proactive and effective response to the Coronavirus pandemic in Indigenous communities.

Question 9

Which of the following best summarises Media text 2?

- A. First Peoples demonstrated a great extent of self-determination despite not having a national representative body.
- B. First Peoples worked hard to prevent the impact of COVID-19, demonstrating cultural continuity.
- C. First Peoples did not demonstrate self-determination in their approach to dealing with COVID-19.
- D. First Peoples demonstrated a great extent of cultural continuity in their approach to dealing with COVID-19.

Question 10

What do these media texts suggest about the role of cultural determinants in the maintenance of wellbeing for Indigenous Australians?

- A. Cultural determinants do not impact wellbeing outcomes in Indigenous communities.
- B. The health and wellbeing of Indigenous communities are not as maintained as non-Indigenous communities.
- C. Cultural determinants enable better wellbeing outcomes for Indigenous communities.
- D. Cultural determinants lead to worse wellbeing outcomes for Indigenous communities.

Exam-style

Remember and understand

Question 11 (1 MARK)

One specific endeavour of self-determination is to

- A. work through the trauma and legacy of colonisation policies.
- B. establish partnerships between communities, governments, and non-government organisations.
- C. pass down cultural knowledge.
- D. participate in the implementation of language programs.

Question 12 (2 MARKS)

Using an example, explain what determinants of wellbeing are.

Question 13 (2 MARKS)

Why is it important to consider and acknowledge cultural determinants for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples?

Apply and analyse

Question 14 (1 MARK)

Jarra has been struggling with his wellbeing, particularly in regard to his Indigenous identity. When with Indigenous friends who are from the same mob (community), he feels like an outsider and like he lacks knowledge regarding his Indigenous heritage.

How can Jarra use cultural continuity and self-determination to improve his overall wellbeing?

| | Cultural continuity | Self-determination |
|----|---|---|
| A. | Through learning about Indigenous dance. | By going to music lessons. |
| B. | Through learning about Indigenous storytelling. | By participating in community-controlled organisations. |
| C. | By participating in community events. | Through engaging in Indigenous craft. |
| D. | By understanding the constitution for Aboriginal and Torres Strait Islander people. | Through educating himself on Indigenous art. |

Question 15 (2 MARKS)

Using examples, how can you use cultural determinants for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples?

Questions from multiple lessons

Question 16 (2 MARKS)

Explain how cultural determinants can be considered 'protective factors' for the wellbeing of Aboriginal and Torres Strait Islander communities.

Question 17 (5 MARKS)

Cathy is an Indigenous child who has a specific phobia of fire. They are afraid to engage in cultural activities that involve fire as they believe that they will get severely burnt. They experience intense panic attacks during cultural events, causing them to generally avoid such events.

- a. What indicates that Cathy has a specific phobia? (1 MARK)
- b. What is a factor contributing to their specific phobia? (2 MARKS)
- c. Referring to self-determination, describe how psychoeducation can be used as an intervention for Cathy's specific phobia. (2 MARKS)

Chapter 10 review

Chapter summary

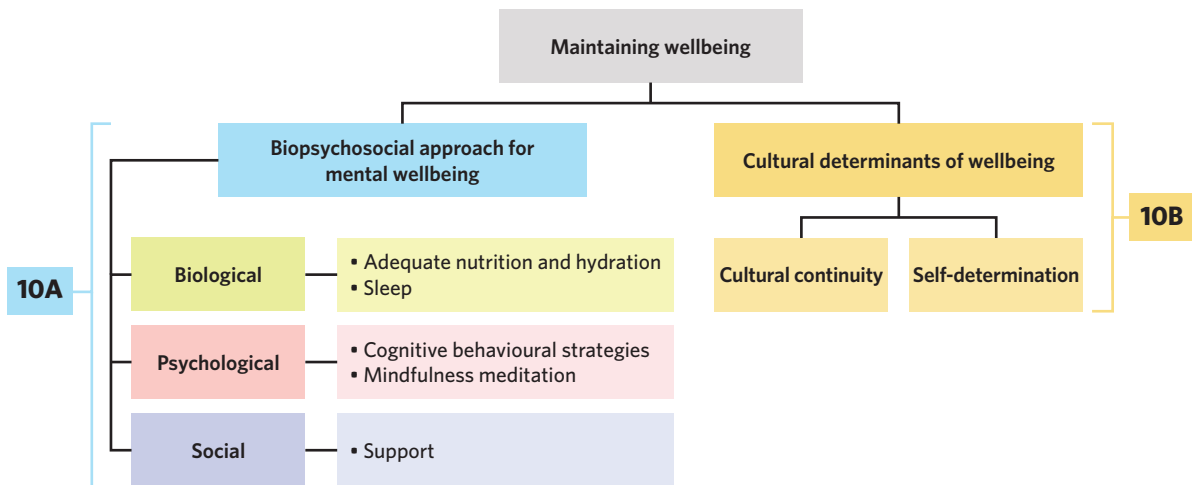
This chapter was all about wellbeing. In this chapter, you learnt about how to improve wellbeing and maintain high levels of wellbeing.

In lesson **10A Biopsychosocial approach: Protective factors for mental wellbeing**, you learnt about protective factors for mental wellbeing. In particular:

- you applied the biopsychosocial approach to mental wellbeing
- you explored ways to maintain and promote mental wellbeing through three types of protective factors:
 - biological
 - psychological
 - social.

In lesson **10B Cultural determinants of wellbeing for Aboriginal and Torres Strait Islander peoples**, you learnt about cultural determinants of wellbeing as integral for the maintenance of wellbeing among Aboriginal and Torres Strait Islander peoples. In particular, you learnt about:

- cultural continuity
- self-determination.



Chapter review activities

Review activity 1: Key terms

Fill in the table with descriptions of the key terms that you learnt about in chapter 10.

| Key term | Description |
|----------------------------------|-------------|
| Mental wellbeing | |
| Protective factors | |
| Biological protective factors | |
| Adequate nutrition and hydration | |

Continues ►

| Key term | Description |
|----------------------------------|-------------|
| Sleep | |
| Psychological protective factors | |
| Cognitive behavioural strategies | |
| Mindfulness meditation | |
| Social protective factors | |
| Support | |
| Determinants of wellbeing | |
| Culture | |
| Cultural continuity | |
| Self-determination | |

Review activity 2: Reflect and respond

Search for 'Indigenous Mental Health' (Indigenous Health MeDTalk, 2017) on YouTube and watch the 8-minute and 58-second video.

Take notes on the following concepts as they are explained in the video.

| Concept | Notes |
|---|-------|
| Biological aspects of mental wellbeing | |
| Psychological aspects of mental wellbeing | |
| Social aspects of mental wellbeing | |
| Connection to Country | |
| Cultural expression and cultural continuity | |
| Self-determination | |
| Family, kinship, and community | |

Reflect on the following questions. You may write down your answers or discuss them with your peers.

1. Was there anything in the video that surprised you or interested you?
2. What does the video suggest are the main differences between Aboriginal and Torres Strait Islander perspectives on wellbeing compared to Western perspectives on wellbeing?
3. Why do you think it is important that people watch and understand this video?

Chapter 10 test

Multiple choice

Question 1 (1 MARK)

Mental wellbeing is best described as

- A. being able to focus, think positively, and function.
- B. an individual's psychological state, including their ability to think, process information, and regulate emotions.
- C. not needing to use cognitive behavioural strategies.
- D. an individual's brain capacity, with a focus on their ability to store and process information.

Question 2 (1 MARK)

A psychological protective factor that could be used to maintain mental wellbeing is

- A. the use of cognitive and behavioural strategies.
- B. accessing support from family and friends.
- C. the consumption of healthy food.
- D. avoiding going out to get adequate sleep.

Question 3 (1 MARK)

Phoebe and Roxxi are sisters and get along well. Recently, Roxxi has been struggling with her mental wellbeing as she has been feeling a bit stressed and anxious. Phoebe wants to help Roxxi but she is not sure what to do.

According to the biopsychosocial approach, which of the following options best outlines advice that Phoebe could give to Roxxi?

- A. Phoebe could advise Roxxi to engage in mindfulness meditation as it involves recognising and changing dysfunctional thought and behavioural patterns.
- B. Phoebe could advise Roxxi to increase her sleep, such as sleeping all day and all night, as she will then avoid any risk of partial sleep deprivation.
- C. Phoebe could advise Roxxi to practice meditation in which she focuses on her present experience to promote feelings of calm and peace.
- D. Phoebe could give Roxxi space to help her deal with and process her emotions.

Question 4 (1 MARK)

Self-determination is best described as

- A. the passing down and active practice of cultural knowledge, traditions, and values from generation to generation.
- B. having a strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs.
- C. the rights of all peoples to freely pursue their personal development.
- D. the rights of all peoples to freely pursue their economic, social, and cultural development without outside interference.

Question 5 (1 MARK)

Culture is

- A. important in the maintenance of wellbeing for Aboriginal and Torres Strait Island peoples.
- B. having a strong sense of identity, values, and tradition.
- C. having a connection between the past, present, and future, which drives behaviour and beliefs.
- D. All of the above.

Short answer

Question 6 (6 MARKS)

Callie feels closely connected to her Indigenous identity and is heavily involved in her Indigenous community as she believes this is important to who she is. Often, she takes part in many activities in her community that help her understand her culture, such as singing and storytelling. Recently, she has been helping to organise an Indigenous music and arts program in her community. However, some of Callie's friends, although they believe it is important, struggle to feel connected to their Indigenous identity and community.

- Is Callie likely to experience cultural continuity and self-determination? Justify your response. (4 MARKS)
- With reference to cultural determinants of wellbeing, suggest some advice Callie may provide her friends. (2 MARKS)

Question 7 (9 MARKS)

Cloe has a great support system of friends at school, her friendship group includes her, Sasha, Jade, and Yasmin. Whenever one of the girls is upset or struggling, the others always reach out and provide advice and support.

- What type of protective factor for mental wellbeing is evident in the scenario? (1 MARK)
- Suggest how Cloe's friends may help her to maintain high levels of mental wellbeing. (2 MARKS)
- Cloe believes she will always have high levels of mental wellbeing because she has her friends to support her. Evaluate whether this belief is accurate and justify your response. (3 MARKS)
- Discuss how Cloe could use a biopsychosocial approach to maintain high levels of mental wellbeing. (3 MARKS)

Question 8 (2 MARKS)

With reference to a specific determinant of wellbeing, suggest how Aboriginal and Torres Strait Islander peoples may maintain high levels of wellbeing.

Question 9 (10 MARKS)

Mr Byo and Ms Syco are the year level coordinators for year 11 and year 12 at a high school and are wanting to implement a program that helps to promote the wellbeing of their students. The year 11 and year 12 cohort has a large number of Aboriginal and Torres Strait Islander students. The teachers are collaborating with the wellbeing coordinator Mr Sochal to develop their wellbeing program, who has suggested that they create a combined program using the biopsychosocial approach and cultural determinants of wellbeing. Mr Byo and Ms Syco meet on Monday, when Mr Sochal is unavailable, to decide the content of the wellbeing program.

Using the information provided and your own knowledge, create a detailed and organised set of notes that Mr Byo and Ms Syco would have taken during the meeting to give to Mr Sochal.

Unit 4 AOS 2 review

The VCE study design outlines that upon completion of this area of study, you must be able to ‘discuss the concept of mental wellbeing, apply a biopsychosocial approach to explain the development and management of specific phobia, and discuss protective factors that contribute to the maintenance of mental wellbeing’.

SAC assessment 1

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- analysis and comparison of two or more contemporary media texts

Use the following information to answer questions 1–6.

Media text 1

How to boost your mental wellbeing

Mental wellbeing is a state in which you feel able to keep up with your work and your studies, maintain social connections, be involved with your community, and bounce back when faced with challenges.

But how can you boost your mental wellbeing?

You can learn new coping skills for when times get tough, such as:

- expressing yourself through artistic mediums
- spending time outdoors
- being kind to yourself.

You can connect with others in ways, such as:

- volunteering in the community
- finding a new hobby
- joining a club
- playing a sport.

You can alter your lifestyle, by:

- increasing your physical activity
- getting an adequate amount of sleep
- eating a well-balanced diet
- reducing or abstaining from alcohol and drug consumption.

(Headspace, 2019)

Media text 2

How mental wellbeing is defined

There are many challenges when defining mental wellbeing. It is said that the combination of physical wellbeing and psychological wellbeing comprises one’s overall health. However, what makes someone physically versus psychologically healthy is different.

Physical health is categorised by the absence of illness, whereas mental wellbeing is not equated to the lack of mental illness. This means that individuals who suffer from a mental illness still have the ability to experience high levels of mental wellbeing.

What defines mental wellbeing is influenced by social, cultural, and historical factors. For example:

- cultural values (such as whether independence or group harmony is more important) can dictate the conceptualisation of mental wellbeing.
- broader societal changes can also influence the conceptualisation of mental wellbeing. For example, the term ‘burnout’ (which describes the result of untreated work-related stress), that is associated with low levels of mental wellbeing, only came about after the introduction of the 40-hour workweek.

(Nortje, 2021)

Question 1 (7 MARKS)

In media text 1, mental wellbeing is said to occur when 'you feel able to keep up with your work and your studies'.

- Outline and explain what aspect of wellbeing this sentence captures. (2 MARKS)
- Evaluate how applicable this statement is to broader society. Justify your response using two examples. (3 MARKS)
- Suggest how this sentence relates to the social, cultural, and historical factors that influence how mental wellbeing is defined that are discussed in media text 2. (2 MARKS)

Question 2 (9 MARKS)

In media text 2, it is stated that 'individuals who suffer from a mental illness still have the ability to experience high levels of mental wellbeing'.

- Justify this statement with reference to resilience and the mental wellbeing continuum. (3 MARKS)
- Without intervention, individuals who are experiencing a specific phobia may find themselves experiencing low levels of mental wellbeing. With reference to evidence-based interventions and the biopsychosocial model, discuss the ways in which an individual with a specific phobia could achieve high levels of mental wellbeing. (6 MARKS)

Question 3 (7 MARKS)

Media text 1 refers to 'community' and media text 2 refers to 'culture'.

- Explain what 'culture' may mean to Aboriginal and Torres Strait Islander peoples. (1 MARK)
- Compare self determination and cultural continuity as two cultural determinants of wellbeing and briefly describe how each determinant contributes to mental wellbeing. (4 MARKS)
- How may external influences, such as community, contribute to the development and maintenance of a specific phobia? (2 MARKS)

Question 4 (12 MARKS)

Media text 1 outlines multiple suggestions for improving or maintaining one's mental wellbeing.

- With reference to the suggestions in media text 1, outline a biological, psychological, and social protective factor. (3 MARKS)
- With reference to examples from media text 1, compare internal and external factors that may impact mental wellbeing. (4 MARKS)
- Discuss whether implementing a range of the suggestions in media text 1 would guarantee high levels of mental wellbeing. (5 MARKS)

Question 5 (4 MARKS)

Aboriginal and Torres Strait Islander peoples may use the social and emotional wellbeing (SEWB) framework to conceptualise mental wellbeing.

- Media text 1 suggests that eating a well-balanced diet, volunteering in the community, and expressing yourself through artistic means can all positively impact mental wellbeing. How do each of these suggestions apply to the SEWB framework? (3 MARKS)
- In the conceptualisation of mental wellbeing, what do the media texts, the SEWB framework, and the biopsychosocial model have in common? (1 MARK)

Question 6 (2 MARKS)

Media text 2 states that 'the combination of physical wellbeing and psychological wellbeing comprises one's overall health'.

- Explain how this sentence relates to the SEWB framework. (1 MARK)
- Describe one aspect of mental wellbeing for Aboriginal and Torres Strait Islander peoples that is not discussed in either text 1 or text 2. (1 MARK)

Unit 4 AOS 2 review

SAC assessment 2

The following task can be used as a practice SAC. This task is based on the following study design assessment type:

- comparison and evaluation of psychological concepts, methodologies and methods, and findings from three student practical activities

Use the following information to answer questions 1–6.

Mental wellbeing questionnaire

Introduction

Mental wellbeing is a highly complex concept that can be extremely hard to measure. Dr Moses wants to provide teachers with a tool that can be used to monitor their students' wellbeing in a valid and reproducible way. In order to do this, Dr Moses created three potential questionnaires which he wants to compare in order to find which is the most suitable.

Aim

To determine the best method for measuring mental wellbeing in students.

Materials

- copies of questionnaires
- pen
- paper.

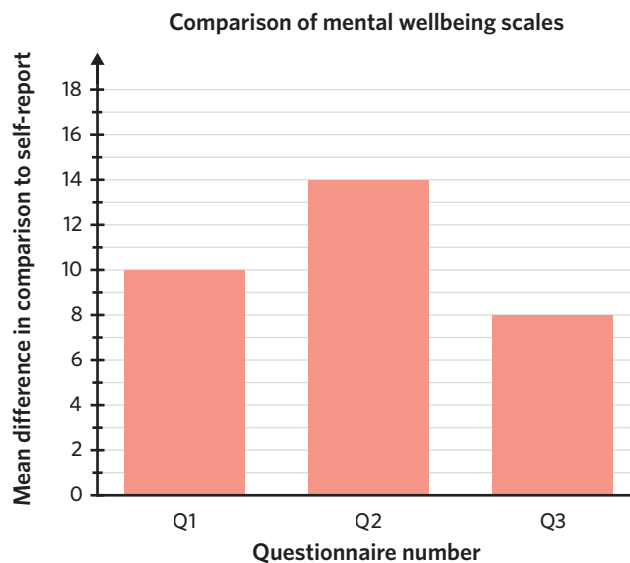
Sample

Dr Moses recruited a sample from a year 12 class from a local school, consisting of 13 males and 17 females.

Method

1. Participants were asked to rate their mental wellbeing on a scale of 0–20.
2. Following this, each student completed three questionnaires provided by Dr Moses.
3. Dr Moses then calculated how different each questionnaire score was from the student's self-rating of mental wellbeing.

Results



Note: The data and questionnaires in this investigation are not real and were created solely for this task.

Questionnaire 1

| | 0 Never | 1 Rarely | 2 Sometimes | 3 Often | 4 Always |
|--|----------------|-----------------|--------------------|----------------|-----------------|
| How often are you able to independently complete tasks? | | | | | |
| How often do you find yourself in a positive mood? | | | | | |
| How often are you able to complete required school and work tasks? | | | | | |
| How often do you see your friends? | | | | | |
| How often do you exercise? | | | | | |

Questionnaire 2

| | 4 Never | 3 Rarely | 2 Sometimes | 1 Often | 0 Always |
|---|----------------|-----------------|--------------------|----------------|-----------------|
| Do you ever experience a disproportionate fear towards a specific stimulus? | | | | | |
| Do you ever go to great lengths to avoid a specific stimulus out of fear? | | | | | |
| Does a fear of a specific stimulus ever disrupt your daily functioning? | | | | | |
| Do you ever experience a physiological stress response when encountering a specific stimulus? | | | | | |
| How often do you think about an excessive fear of a specific stimulus? | | | | | |

Questionnaire 3

| | 0 Never | 1 Rarely | 2 Sometimes | 3 Often | 4 Always |
|---|----------------|-----------------|--------------------|----------------|-----------------|
| How often do you meet your nutritional needs? | | | | | |
| How often do you get an adequate amount of sleep? | | | | | |
| How often do you practice mindfulness? | | | | | |
| How often do you feel supported by those around you? | | | | | |
| How often do you make an effort to think positive thoughts? | | | | | |

Question 1 (4 MARKS)

Dr Moses represented his findings using a graph. With reference to specific data, state two findings that can be interpreted from the graph.

Question 2 (4 MARKS)

Questionnaire 1 asks, 'How often are you able to independently complete tasks?'

- What feature of high wellbeing does this reflect? (1 MARK)
- In general, what else can characterise high levels of mental wellbeing? (1 MARK)
- Identify one internal factor and one external factor that may prevent an individual from being able to independently complete tasks. (2 MARKS)

Question 3 (7 MARKS)

Questionnaire 3 asks, 'How often do you meet your nutritional needs?'

- With reference to the biopsychosocial model and the SEWB framework, suggest why this question may have been included. (3 MARKS)
- Using examples, outline what other biopsychosocial factors are considered in this questionnaire. (4 MARKS)

Question 4 (6 MARKS)

Two students indicated that they experience a physiological stress response when encountering a specific stimulus on questionnaire 2, suggesting that they may have a specific phobia.

- Explain what is meant by the term 'specific phobia'. (1 MARK)
- Compare how an individual may use psychological and biological interventions to manage these symptoms. (2 MARKS)
- Outline one biological, one psychological, and one social factor that may have contributed to the development and maintenance of the students' specific phobia. (3 MARKS)

Question 5 (11 MARKS)

Dr Moses aspires to measure wellbeing in a 'valid and reproducible way'.

- Explain what is meant by validity and reproducibility. (2 MARKS)
- For each questionnaire, evaluate whether internal validity is likely achieved. (9 MARKS)

Question 6 (8 MARKS)

Dr Moses' aim was to create a measure that is applicable to all students.

- Explain what a measure being 'applicable to all students' means and outline two methodological issues that may interfere with this. (3 MARKS)
- With reference to similarities and differences between conceptualisations of mental wellbeing, evaluate whether it would be appropriate to use one measure of mental wellbeing for all students. (5 MARKS)

Extended response guide

Overview

In your final exam, the last question in section B is usually an **extended response** worth **10 marks**.

Unlike other short-answer questions, this question is marked **holistically**, meaning that there are no set number of marks allocated to a particular piece of information. There are different ways to approach and structure your answer. In the 2020 examination report, VCAA said that:

‘It is important to note that assessment of the 10-mark extended response question is based on criterion referenced descriptors, which are applied holistically and reflect the assessor’s consideration of the whole answer. There is no such thing as the ‘right’ answer – the assessors make judgments about the unique qualities of what is written by each student, understanding that this is first draft writing completed under the time constraints of an examination.’

(VCAA, 2020)

According to VCAA (Examination Specifications, 2021), these criteria include:

- Identification and explanation of formal psychological terminology relevant to the question.
- Use of appropriate psychology terminology.
- Discussion of relevant psychological information, ideas, concepts, theories, and/or models, as well as the connections between them.
- Analysis and evaluation of data, methods, and scientific models.
- Drawing of evidence-based conclusions and explanation of limitations of conclusions.

Many extended response questions require you to demonstrate in-depth knowledge of a particular topic, as well as your ability to apply this knowledge to different scenarios. It is your opportunity to show how well you can connect and apply different areas of the study design. Below is a record of the topic and the command terms used in each of the extended response questions in the last study design.

| Year | 2017 | 2018 | 2019 | 2020 | 2021 |
|---------------|----------------------------|--------------------|------------------|------------------|-------------------------------------|
| Topic | Sleep | Stress | Memory | Research Methods | Specific phobia Research Methods |
| Command terms | Create (detailed notes) | Analyse Discuss | Discuss Apply | Evaluate | Analyse Compare Discuss |

This guide will show you what a successful response includes and explain the steps that you can take to effectively plan and write your response in exam conditions.



Annotated sample response

Read the following example responses and take note of the features that have been highlighted. After reading:

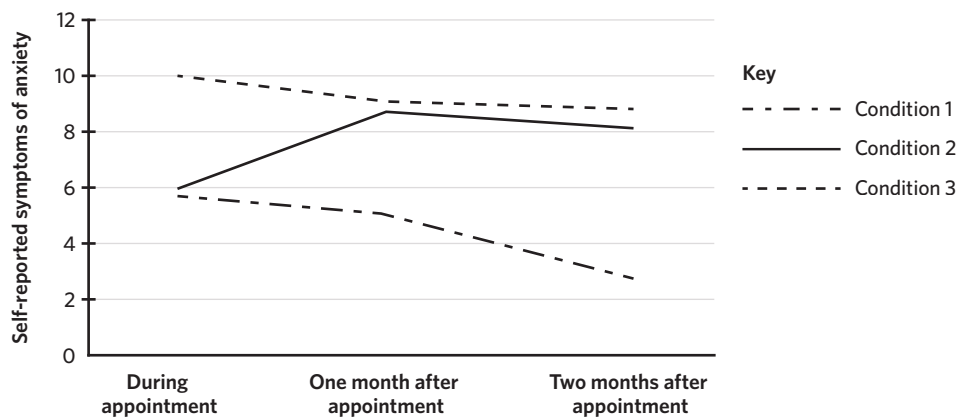
1. Mark each response on the rubric that is included at the end of this guide. What do you think each response would score?
2. Note any elements of the high-scoring response that are missing from the medium-scoring response. What could have been added to improve the medium-scoring response?

Question 7 (10 MARKS)

A research study compared the effects of two evidence-based treatment interventions on 87 patients with dental phobias. Participants were randomly allocated, in equal numbers, to one of three treatment conditions:

- Condition 1 – a single session of systematic desensitisation
- Condition 2 – administration of a benzodiazepine agent (taken before a dental appointment)
- Condition 3 – received no treatment for their dental phobia (control group)

In Condition 1 and Condition 2, the participants experienced fewer symptoms of anxiety during dental appointments than the participants in the control group (Condition 3), as measured by a self-report using a Likert scale. One month after the dental appointment, phobic response returned for the participants in Condition 2 when they subsequently visited the dentist. However, the participants in Condition 1 did not have a return of their phobic response and showed further improvement when they visited the dentist two months later. Of these participants, 21 attended future dental appointments with minimal symptoms of anxiety, compared to only seven participants in Condition 2 and one participant in the control group (Condition 3). The graph below shows the results of the study.



Analyse the results of the research study. In your response, include a comparison in terms of the similarities and differences in participants' symptoms of anxiety, as well as a discussion of how each condition (Condition 1 and Condition 2) acted to reduce participants' symptoms of anxiety.

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USEFUL TIP

To understand what this question is asking, you can break it down as follows.

Analyse the **results of the research study**. In your response, include **a comparison** in terms of the **similarities and differences in participants' symptoms of anxiety**, as well as **a discussion** of how each condition (**Condition 1 and Condition 2**) acted to reduce participants' symptoms of anxiety.

This question is asking for:

- an analysis of the results of the research study.
- a comparison of participants' symptoms of anxiety (similarities and differences).
- a discussion of how each condition (condition 1 and condition 2) acted to reduce participants' symptoms of anxiety.

Sample response (medium-scoring)

The overall pattern of the three conditions is outlined showing some understanding of the experiment in the scenario.

The participants in condition 1 were more likely to experience minimal levels of anxiety symptoms during the two months after the dental appointment compared to the participants in conditions two and three.

Linking terms used to connect ideas. 'Compared' is also a comparative term, which highlights that this aspect of the question is being addressed.

Clearly outlined similarity relating to the participants' symptoms of anxiety across two conditions.

Participants in conditions one and two experienced lower levels of self-reported symptoms of anxiety at all three time points than participants in condition three. However, the self-reported anxiety symptoms of condition one continued to decline from the initial appointment through to two months after the

Uses comparative term.

Outline of a difference in anxiety symptoms between two conditions.

appointment, while the self-reported anxiety symptoms of condition two were higher one and two months after the initial appointment than their symptom ratings during the initial appointment. Notably, although the self-reported anxiety symptoms of participants in condition three were the highest among the three conditions at all time points, the symptoms of anxiety gradually reduced from the initial appointment at one point after the appointment, and further so at two months after the appointment. This is interesting considering that condition three was not exposed to any intervention while participants in condition one were.

Interpretation of the findings and comparisons between two conditions.

Attempt to describe the process of systematic desensitization.

Participants in condition one underwent one session of systematic desensitisation, which is a treatment for specific phobia. It involves working through feared items with a calming technique. Once the treatment has been administered, ideally, a patient should not experience a disproportionate response to the phobic stimulus. This treatment can therefore reduce symptoms of anxiety, which clearly happened in the study as shown by the graph.

Includes a basic evaluation statement of the treatment in the study.

Provides basic definition of key term.

Participants in condition two were administered a benzodiazepine agent before the dental appointment, which is a treatment for specific phobia. Benzodiazepines are short-acting GABA-agonists. Due to individuals with specific phobia typically having low GABA levels, benzodiazepines enhance GABA levels, reducing anxiety symptoms. The reduction in anxiety symptoms is shown in the graph.

Refers to the graph in the study without any detail.

Clear conclusion that evaluates the findings and concepts in the question.

Overall, it is clear that benzodiazepines and systematic desensitisation reduce anxiety and can be used as a treatment for specific phobia.



Sample response (high-scoring)

Begins with a clear link to scenario. As this is research methods, it has a clear summary of the results, citing specific data from the study.

The research study highlighted that 21 out of the 29 participants that took part in systematic desensitisation attended future dental appointments with minimal symptoms of anxiety, while this only applied to 7 of the 29 participants that took the benzodiazepine and only 1 in the control group.

This demonstrates that systematic desensitisation may be the most effective intervention for phobic responses.

Use of specific data from the study. Good use of brackets to make writing clear and concise.

There were several interesting **similarities and differences** between anxiety symptoms in all experimental conditions.

Clear link to the question, showing the examiner which part of the question is being addressed.

Comparative term indicating a discussion of difference

For example, participants in conditions 1 and 2 both reported lower levels of anxiety (**approximately 6 on a Likert scale**) than those in the control condition (approximately 10) at the time of their appointment. **However**, those in condition 1 (systematic desensitisation) reported a further reduction in anxiety symptoms, both one and two months after the appointment (approximately 5 and 3 respectively). **By contrast**, participants in condition 2

Linking terms used to connect ideas. 'Contrast' is also a comparative term, which highlights that this aspect of the question is being addressed.

Comparative term indicating a discussion of similarities

(benzodiazepine agent) showed an increase in anxiety symptoms one month after the appointment (approximately 9). In fact, their reported anxiety levels **were similar** (even though slightly less) than those in the control condition at the end of the study.

Clear definition provided that demonstrates understanding of key term. Uses terminology from the study design in labelling benzodiazepines as a biological intervention.

Benzodiazepines are a short-acting biological intervention against specific phobia. Benzodiazepine is a GABA agonist, **which means it is a medication that mimics the role of the main inhibitory neurotransmitter GABA.** People with a specific phobia tend to have overall lower levels of GABA, which results in increased firing of post-synaptic neurons and thus anxiety symptoms. Benzodiazepine agents bind to GABA receptors, increasing the effectiveness of GABA neurotransmitters, thus inhibiting the firing of postsynaptic neurons and reducing overall anxiety symptoms. **This study shows that this is an effective treatment in the short-term (during the appointment), but may not work in the long-term (one or two months after the appointment).**

Short explanation that expands on the definition of the key term, demonstrating further understanding.

Clear conclusion. Uses language within the scenario (referring to specific time after appointments).

Linking term used.

Contrastingly, systematic desensitisation is a **psychological intervention for specific phobia.** It involves learning a **calming technique, such as breathing retraining, and then creating a 'fear hierarchy' of a phobic stimulus that ranges from least feared to most feared.** A patient is then systematically exposed to each level of the hierarchy, and taught to employ their calming strategy. **They can only move on to the next level once their anxiety symptoms have ceased at the previous level.**

Clear definition of key term provided. Uses terminology from the study design in labelling it a psychological intervention.

Short explanation that expands on the definition of the key term, demonstrating further understanding.

For example, in this study the fear hierarchy may have **a picture of a dentist, touching dental tools and then being in a dentist office.** By working through this fear hierarchy, patients learn to effectively manage their anxiety symptoms and confront their phobic stimulus. This study shows that systematic desensitisation is an effective treatment for specific phobia both in the short and the long-term.

Key term is linked back to the scenario through specific examples.

Overall, **this study highlights that, although both interventions work in the short term, one dose of benzodiazepine is not enough to eliminate a phobia in the long-term, while one session of systematic desensitisation is effective.**

Clear concluding statement.

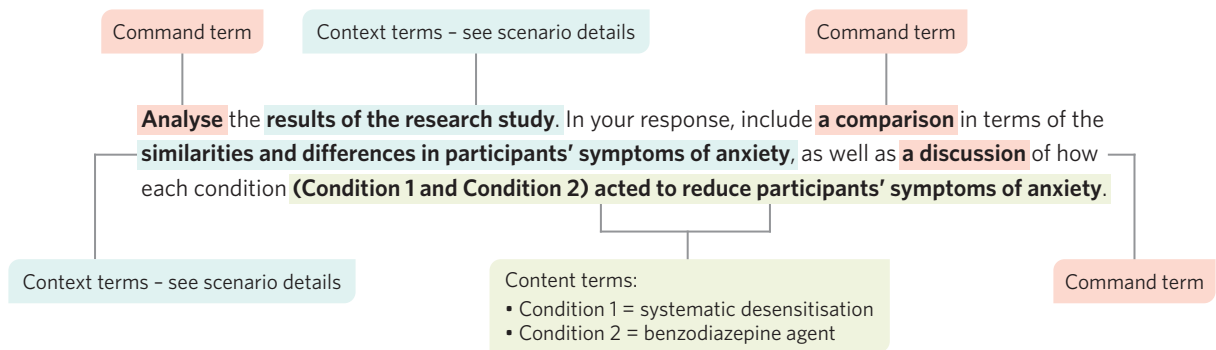
Tips for tackling the extended response question

Extended response questions can be challenging. The following steps can help you understand what is being asked of you and can help you to answer extended response questions accordingly.

1. Highlight all the key terms in the question. Use a different colour for each type of key term. Look out for:
 - topic-specific terms (content words)
 - scenario details (context words)
 - instruction terms (command words).

It is useful to start with the question first, and then read the detailed scenario. This will enable you to read the scenario more efficiently because you know what to look for.

For example, in the question above you may highlight the following:



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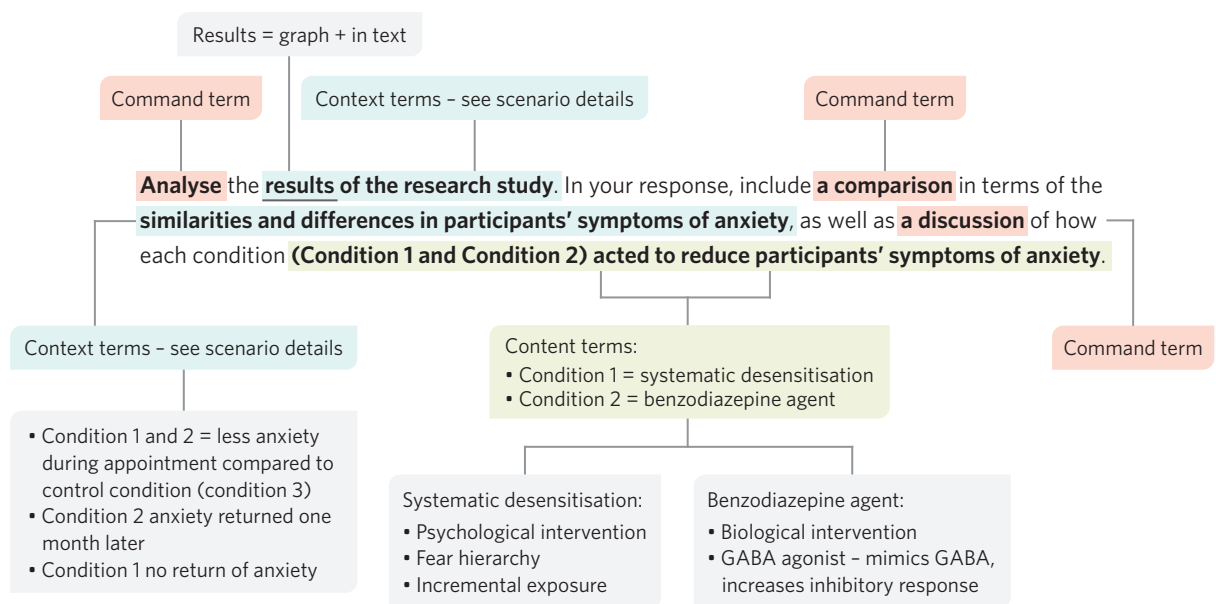
USEFUL TIP

You can remember the three categories of key terms as the '3 C's':

- Content words
- Context words
- Command words

You can use this framework for any question in the exam!

2. Read the scenario carefully. Brainstorm any relevant theory, models, or details for each key term that you highlighted in step one. It can be helpful to do this as a brainstorm around the question. For example:



Please note that there are many different ways of approaching this, and you should experiment to find out which way works best for you.

3. Plan your response.

A short plan goes a long way when you are under pressure in an exam. It is a good idea to list (in dot points) what you will discuss in each paragraph of your response. Use the key terms you have highlighted in the question to guide you. For example, in the above question a plan may look like this:

| | |
|---------------------------------|---|
| Section 1 (Introduction) | • Describe the results. |
| Section 2 | • Compare similarities and differences of anxiety symptoms across groups. |
| Section 3 | • Discuss how benzodiazepine agents (condition 2) work to reduce anxiety. |
| Section 4 | • Discuss how systematic desensitisation (condition 1) works to reduce anxiety. |
| Section 5 (Conclusion) | • Overall conclusions, implications, and evaluation of the study. |

4. Write your response.

Although there is no set length for the extended response, or format that it must follow (unless specified by the question), it can be helpful to broadly follow a paragraph structure similar to what you may use in English essays. You may be familiar with the TEEL paragraph structure:

- **T**opic sentence
- **E**xplain
- **E**vidence
- **L**ink back.

This can be a helpful structure for each section of your extended response.

- **Topic sentence:** identify the key idea, model, theory, or term.
- **Explain:** define the key term and explain it further. Provide an example if necessary.
- **Evidence:** discuss any relevant details from the scenario. Remember to provide a concluding statement that evaluates the evidence or idea you have discussed.
- **Link back:** links back to the scenario.

Practice question

Answer the following extended response question. You may use the rubric that follows to mark your response and identify areas of improvement.

Gita is a 22-year-old student in her final year of university. Gita arrived in Australia when she was 12 years old. She is from a non-English-speaking background and is the first female in her family to attend university. She has generally been able to manage her parents' expectations, academic demands, part-time work and the usual daily irritations that have come her way.

When Gita lost her part-time job at the beginning of Semester 1, she experienced initial shock but quickly tackled this problem by drawing on her family and friendship network, which helped her find a new part-time job. However, at the end of Semester 1, her first relationship break-up proved more challenging because she found her usual supports were not enough. She used meditation and dancing classes to help her refocus. Gita developed a cold after the break-up but still managed to stay on top of things.

However, there was one point at the beginning of Semester 2 when Gita did struggle. The news that her car needed expensive repairs was a major setback that she had not budgeted for. She felt exhausted and overwhelmed by the situation but decided to keep the problem to herself, feeling that she should be able to manage it on her own.

Towards the end of Semester 2, Gita developed insomnia and headaches, and finally visited her family doctor. The doctor explained that these symptoms were stress-related and referred her to a psychologist. The psychologist was able to help Gita view her situation differently and assist her with realising that it was a temporary problem that would be resolved once she finished university and started full-time work. Gita would then be able to apply for a bank loan to fix her car.

With reference to Gita's situation, write a detailed analysis of her sources of stress, biological responses and psychological responses. In your response, discuss the theories and models of stress and/or coping that are relevant to this scenario. (10 MARKS)

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Rubric

| VCAA Criterion | Not shown | Beginning | Developing | Consolidating | Extending |
|--|--|---|---|--|--|
| Identifies and explains formal psychological terminology relevant to the question | Does not attempt to use key psychological terms | Uses some psychological terms that are not always relevant to the question | Consistently uses and defines psychological terms that are explicitly stated in the question | Consistently uses, defines, and explains terms explicitly stated in the question | Consistently uses, defines, and explains psychological terms that are both explicitly stated and otherwise related to the question |
| Discusses relevant psychological information, ideas, concepts, theories, and/or models and the connections between them | Provides inaccurate or irrelevant descriptions or examples of psychological ideas, concepts, theories, and/or models | Identifies relevant psychological ideas, concepts, theories, and/or models without providing details or examples | Discusses some relevant psychological concepts, theories, and/or models in isolation from one another | Discusses all relevant psychological concepts, theories and/or models that are relevant to the question and explains their relationship or connection to one another | Discusses all psychological concepts, theories and/or models that are relevant to the question and explains their relationship or connection, including relevant implications on the given scenario |
| Analyses and evaluates data, methods, and scientific models | Does not discuss data, methods, or scientific models relevant to the question | Breaks down some of the data, methods, or models within the question, but misses important features | Accurately breaks down the data, methods, or models and discusses most of the important features | Accurately breaks down the data, methods, or models and clearly highlights the important features | Accurately breaks down the data, methods, or models, clearly highlighting the important features and explaining what may have caused particular trends or phenomena |
| Analyses and evaluates data, methods and scientific models | Does not discuss data, methods, or scientific models relevant to the question | Comments on either the strengths or limitations of data, methods and scientific models within the question (but not both) | Comments briefly on both the strengths and limitations of the data, methods and scientific models within the question | Assesses the value of evidence by balancing the strengths and limitations of the data, methods, and scientific models within the question | Assesses the value of evidence by balancing the strengths and limitations of the data, methods, and scientific models within the question, linking this conversation to their overall generalisability |
| Draws evidence-based conclusions and explains limitations of conclusions | Does not provide a conclusion | Provides an inaccurate or incomplete conclusion | Provides an accurate conclusion | Provides an accurate conclusion, including limitations, that links back to the scenario | Provides an accurate conclusion that links back to the scenario, cites specific evidence and discusses , real-world implications of conclusions, including limitations |
| Structures answer effectively | No evidence of structure or not enough of a response to assess | Answer provides minimal detail and is presented in dot points or one continuous text (no paragraphs) | Answer uses paragraphs to organise discussion | Answer uses an effective scientific tone and paragraphs that are clearly organised and each centres on one key idea, concept, model, or theory | Answer uses paragraphs that are clearly organised and each centres on one key idea, concept, model, or theory Writing is expressive and cohesive and achieves an appropriate scientific tone |
| Approximate total marks (/10) | Very low (0) | Low (1-3) | Medium (4-6) | High (7-8) | Very High (9-10) |

UNIT 4 AOS 3

How is scientific inquiry used to investigate mental processes and psychological functioning?

STUDY DESIGN DOT POINTS

Investigation design

- psychological concepts specific to the selected scientific investigation and their significance, including definitions of key terms
- characteristics of the selected scientific methodology and method, and appropriateness of the use of independent, dependent and controlled variables in the selected scientific investigation
- techniques of primary quantitative data generation relevant to the selected scientific investigation
- the accuracy, precision, repeatability, reproducibility, and validity of measurements
- the health, safety and ethical guidelines relevant to the selected scientific investigation

Scientific evidence

- the nature of evidence that supports or refutes a hypothesis, model or theory
- ways of organising, analysing and evaluating primary data to identify patterns and relationships, including sources of error and uncertainty
- authentication of generated primary data using a logbook
- assumptions and limitations of investigation methodology and/or data generation and/or analysis methods
- criteria used to evaluate the validity of measurements and psychological research

Science communication

- conventions of science communication: scientific terminology and representations, symbols, formulas, standard abbreviations and units of measurement
- conventions of scientific poster presentation, including succinct communication of the selected scientific investigation, and acknowledgements and references
- the key findings and implications of the selected scientific investigation



ACTIVITY

Log into your Edrolo account for activities that support this lesson.

During Unit 4, you will conduct your own practical investigation to complete Area of Study 3. The findings from your investigation will be presented in a scientific poster. Your investigation will focus on a topic relating to mental processes and psychological functioning which you have learnt about during Unit 3 or Unit 4. This assessment will account for 40% of your Unit 4 mark.

To conduct this practical investigation, you will need to refer to the skills you have learnt about in **Chapter 1 Key science skills**. You will also learn some new skills that you will need to conduct your own practical investigation.

Student-designed scientific investigation guide

This assessment task will involve a range of steps that need to be carried out in a scientific investigation. To help you approach this task, this guide will break down each of the steps you will need to undertake in order to accurately design, conduct, and present your investigation. It will also include examples to help support your understanding of the task.

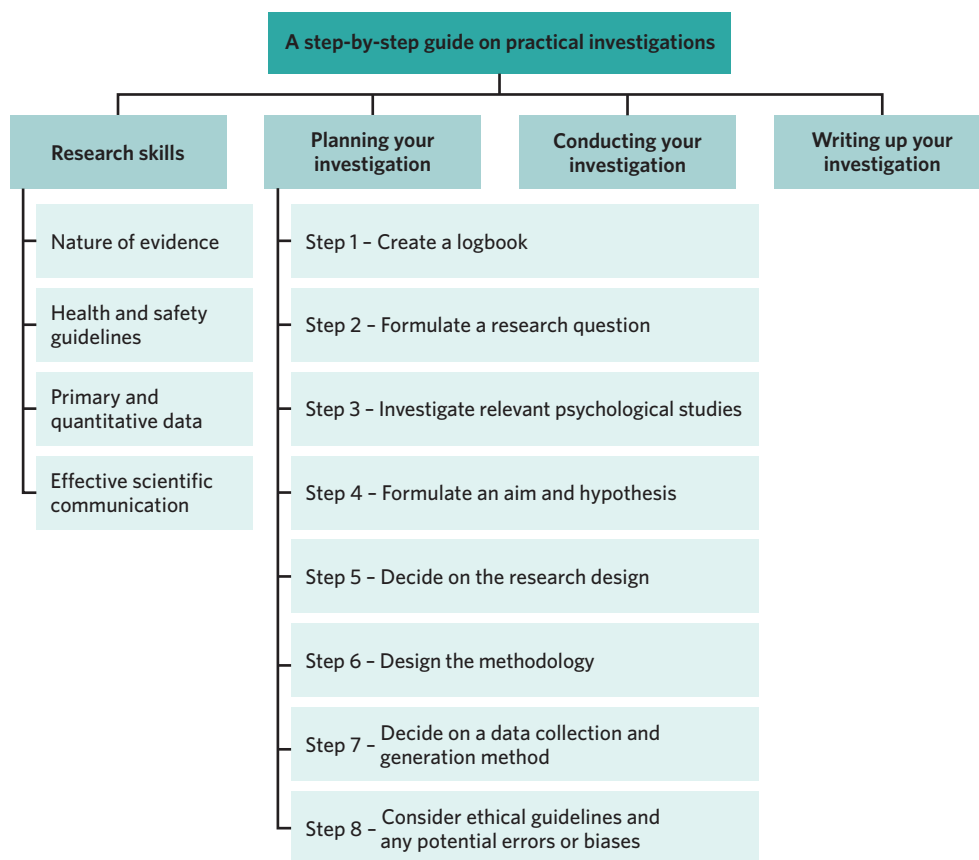


Figure 1 A mindmap of what will be covered in this guide

The steps you need to take to carry out your investigation will involve:

1. Developing a research question related to mental processes and psychological functioning. This will involve looking at contemporary research available for your topic to decide what you want to study and how you should conduct the study.
2. After you have chosen a research question, you will then have to design your practical investigation. In designing your investigation, you will have to consider different components, such as the formulation of your hypothesis, an appropriate methodology for your study, and the type of data you will collect.
3. After conducting your practical investigation, you will need to organise the primary, quantitative data that you have collected.
4. You will then use the data that you collected in combination with your findings from contemporary psychological research studies to form a conclusion in response to the research question.
5. Once you have conducted your practical investigation, you will have to present your findings in a scientific poster format.
6. You will also need to complete a logbook through the course of this assessment.

Research skills

Before you start designing and conducting your student-designed investigation, you need to make sure that you understand all of the key concepts and skills that you will need to use. You have already learnt about many of these concepts in chapter 1, such as validity and reliability, accuracy, and the use of data. There are additional key knowledge points, which are outlined below, that you will need to learn before carrying out your student-designed investigation.

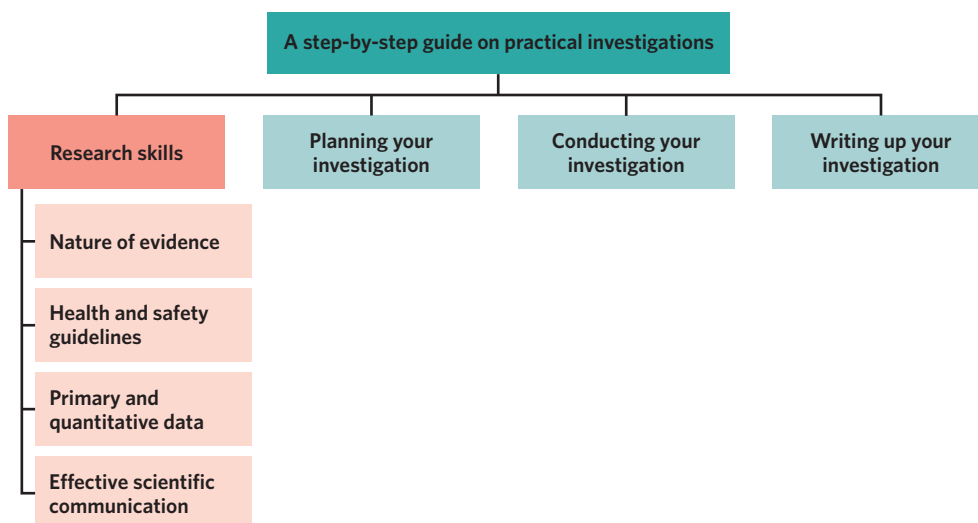


Figure 2 In this section of the guide, you will learn about research skills

Nature and validity of evidence

How do you know which resources to trust? Which resources have strong evidence? Is Wikipedia a reliable source of information? These are all questions that we need to consider before starting this assessment.

Evidence involves information that either supports or rejects claims, beliefs, or ideas. When looking at the strength of a source of evidence, there are many things we need to consider. These include:

- What form of evidence is it?
- Do we trust where the information came from? Is it a reputable source?
- Is the evidence scientific or non-scientific?
- Is the information biased in any way?
- Are there any errors in the information?

LESSON LINK

In lesson **1A Introduction to research**, you learnt about scientific and non-scientific ideas, as well as anecdotes and opinions. A summary of these concepts is outlined in table 1.

Table 1 Scientific versus non-scientific ideas

| | Explanation |
|-----------------------------|--|
| Scientific ideas | Scientific ideas generally aim to be objective, utilise empirical evidence, and are formed using the scientific method. |
| Non-scientific ideas | Non-scientific ideas may be non-objective, unempirical, imprecise, and do not use the scientific method. Non-scientific ideas may be formed on the basis of: <ul style="list-style-type: none"> • an anecdote, which is a story based on personal experience • an opinion, which is the view or perspective of someone not necessarily based on evidence. |

Scientific ideas aim to be objective and are formed using the scientific method. Due to this, scientific ideas are more highly regarded by researchers and are more likely to provide strong evidence for your investigation than non-scientific ideas. As such, scientific evidence can be used to support or refute a hypothesis, model, or theory.

There are multiple forms of scientific and non-scientific evidence that you should be familiar with before starting this assessment. These are opinions (particularly expert opinions), anecdotal evidence, case studies, and psychological research studies. If we were to place these four forms of evidence on a hierarchy based on the strongest to weakest evidence, it would look like the pyramid used in figure 3.



Figure 3 Simple pyramid of evidence

To understand why the forms of evidence are ordered as they are in figure 3, we need to understand what these sources of evidence are. In chapter 1, you learnt about anecdotes and opinions as examples of non-scientific ideas. Here are some further explanations of these types of evidence, as well as psychological research studies.

- **Psychological research studies** refer to academic research investigations published in scientific journals. They are also often known as journal articles and are the strongest form of evidence as they use the scientific method, which provides a rigorous form of evidence.
 - There are multiple forms of research methodologies, with some forms (such as experiments) being stronger than others (such as observational studies).
- **Case studies** involve the investigation of one individual or a small group of individuals. These typically occur in rare circumstances, such as examining an individual who has undergone a rare brain injury.
 - Case studies often provide insight into rare and novel circumstances which have not been investigated before. Therefore, case studies can lead to the development of rigorous psychological research studies. However, findings from case studies are not representative of a population and as such, cannot be generalised.
- **Expert opinion** refers to an opinion held by an individual who has specialised knowledge or training in a relevant field. Expert opinions can provide educated predictions or explanations about phenomena that may not have been scientifically tested.
 - Expert opinions differ from normal opinions and are more valuable and reliable. If an individual, who is not an expert on a topic, gives an opinion, then that form of evidence would be considered significantly weaker.
- **Anecdotal evidence** refers to a personal recount of an event or experience. This can help to provide insights into events or experiences which cannot be examined through scientific investigations.

PSYCHOLOGY EXPLORATION

If you choose to study psychology at university, you will most likely hear of **peer-reviewed studies/research**. In the field of psychology, this usually involves research articles that have been scrutinised and analysed by multiple experts on the relevant research topic, before being published in journals. This process typically involves multiple rounds of back-and-forth feedback between the experts conducting the peer-review and the researcher/s, until the journal article is finalised and published. In such a way, articles that are peer-reviewed are said to generally have strong evidence as well as scientific reliability and validity.

PSYCHOLOGY EXPLORATION

If you choose to study psychology at university, you will also learn about systematic reviews and meta-analyses, which are additional forms of psychological research studies. These two types of psychological research studies are the most reputable form and subsequently, sit at the top of the pyramid of evidence. This is presented in figure 4.

Explanations of these types of psychological research studies are as follows.

- A **meta-analysis** is a statistical approach to examine all the quantitative findings of existing psychological studies relating to a particular research question, using a rigorous method. This involves examining data from all the relevant studies and processing it to account for differences in the studies, such as the differences in sample size. Once differences in the data sets have been accounted for, the findings from all studies are analysed and synthesised. Any differences or similarities in the studies relating to the topic are presented in the meta-analysis.
- A **systematic review** examines all the relevant literature and existing psychological studies relating to a particular topic, using a rigorous searching method on databases to ensure all relevant studies are accounted for. The information gathered is analysed and evaluated and then synthesised to identify the overall findings relating to the topic.

As you may have noticed, meta-analyses and systematic reviews undergo similar processes. This is because meta-analyses are a form of systematic reviews. However, due to their rigorous process of examining quantitative data from existing studies and transforming this data to allow for accurate comparisons across studies, it presents a greater quality of evidence than general systematic reviews.

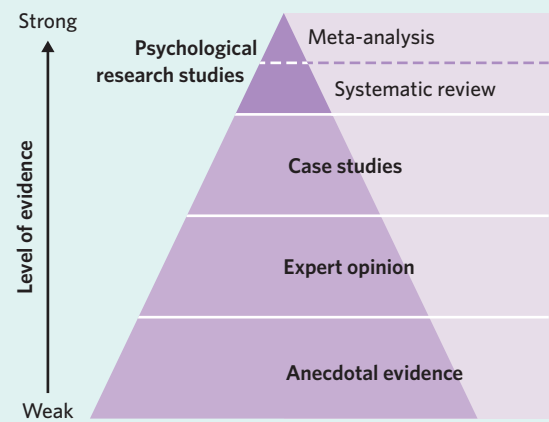


Figure 4 Advanced pyramid of evidence

There are some other things to look at when considering the quality of evidence a source presents, including:

- **when** the source was published. Typically, more recent research, particularly when examining contemporary psychological research, provides better evidence. If the source is 10 or more years old, there is a risk that the information presented may have since been developed in the field of psychology.
- **where** the source was published. You have learnt that psychological research studies are typically published in scientific journals, which are highly esteemed. As such, if you use a psychological research study that has been published in a scientific journal in your investigation, the source is likely to be high-quality evidence.

You have already learnt about the concepts of validity, uncertainty, repeatability, reproducibility, and sources of error and bias in chapter 1. When conducting your research and drawing conclusions from information, it is important to consider whether these studies are valid and reliable, in conjunction with any errors they may have.

LESSON LINK

To evaluate psychological research you will need to draw upon multiple concepts that you learnt about in lesson **1F Evaluating research**. Table 2 outlines these concepts. You can also go back to this lesson if you need a refresher on them.

Table 2 Concepts outlined in chapter one relating to evaluating research

| Concept | Definition |
|------------------------|---|
| Uncertainty | The lack of exact knowledge relating to something being measured, due to potential sources of variation in knowledge. |
| Validity | The extent to which psychological tools, findings, and investigations truly support their findings or conclusions. |
| Repeatability | The extent to which successive measurements or studies produce the same results when carried out under identical conditions within a short period of time (e.g. same procedure, observer, instrument, instructions, and setting). |
| Reproducibility | The extent to which successive measurements or studies produce the same results when repeated under different conditions (e.g. different participants, time, observer, and/or environmental conditions). |

Psychological research is repeatable and reproducible if it has been conducted in a way that means it can be carried out in the future (either under the same or changed conditions) and attain similar, or the same, results. Psychological research studies that are repeatable and reproducible have certain characteristics, such as having:

- standardised instructions and procedures
- valid measurements
- operationalised variables
- a clear method, including detailed explanations about how to carry out the study and data analysis.

There are also different ways in which you can evaluate the validity of psychological research. This can include asking the following questions when you are evaluating a research source:

- Does the study measure what it intends to measure?
- Do changes in the independent variable explain the changes in the dependent variable? Could these changes be explained by extraneous or confounding variables? If so, how could the researchers have controlled for these variables?
- Can the results of the investigation be generalised to the research population? Is the setting, in which the study was conducted, appropriate for the research question? Were the sample size and sampling technique adequate to attain a representative sample?

Health and safety guidelines

When conducting practical investigations, it is important to take into account the rights of research participants and ensure that their health and safety are protected. To ensure this, health and safety guidelines need to be taken into account. Some examples of health and safety guidelines include ensuring that:

- any tasks you administer to participants do not inflict any harm (physiologically and psychologically).
- the environment/s in which you conduct the practical investigation is safe.
- the rights of participants are protected. This includes voluntary participation, informed consent, withdrawal rights, confidentiality, deception, debriefing, and the no-harm principle, all of which are outlined in lesson **1G Ethical considerations**.

It is vital that you follow all health and safety guidelines when conducting your research investigation.

Primary and quantitative data

In completing your student-designed scientific investigation, you will have to collect your own data, meaning that the data you collect will be primary data. You learnt about collecting primary data in lesson **1E Organising and interpreting data**. Primary data collection refers to data that the researcher directly collects that they will later organise and interpret. As such, primary data is original and unique to the study and has to undergo data generation methods (such as using the formulas to calculate measures of central tendency) after being collected by the researcher.

You also learnt about quantitative data. Quantitative data refers to data that is expressed numerically. For example, in your investigation, you could ask your participants to rate their happiness on a rating scale or measure how many seconds it takes them to complete a task.

Effective scientific communication

For this assessment, it is important to consider that you communicate the scientific information clearly and succinctly (by presenting information in a way that is brief but clear). To ensure that you effectively communicate your findings, it is important to also consider the following questions. It may be helpful to use these questions as a checklist before you finalise your scientific poster.

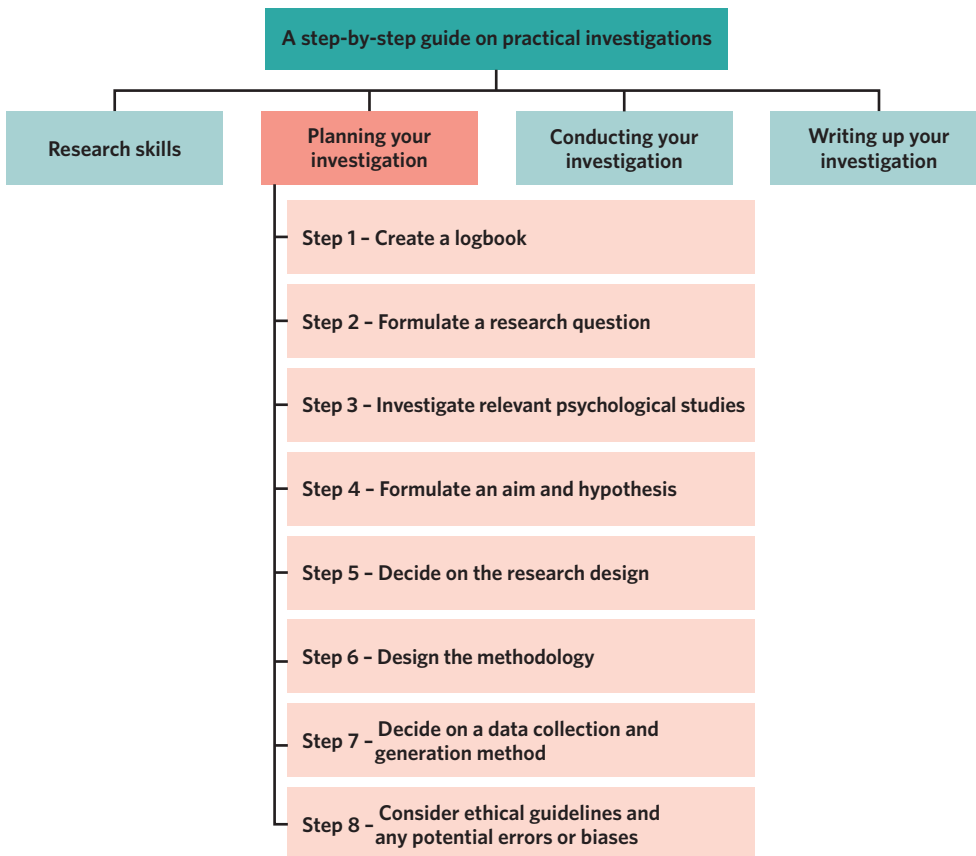
- Is the information I'm presenting accurate? Where have I sourced this information from?
- Have I defined the key terms and explained them clearly?
- Have I supported my claims with strong evidence?
- Have I presented my information in a clear and concise way? Is this information easy to read and understand?
- Have I presented data in an accurate and appropriate way?
- Is the information appropriately presented for my target audience?
- Is the information appropriately presented for the purpose of my task?

LESSON LINK

In lesson **1E Organising and interpreting data**, you learnt about secondary and qualitative data. Even though you will not use secondary or qualitative data in your scientific investigation, it can sometimes be useful to compare these concepts to primary and quantitative data.

- **Secondary data** is sourced from others' prior research
- **Qualitative data** is data that is expressed non-numerically

Planning your investigation



USEFUL TIP

A lot of the steps outlining how to plan your study are interrelated. A good way to design your study is to conduct a quick brainstorm about the elements you definitely want to include. During your planning, you may need to revise previous steps or plan steps simultaneously, depending on your investigation. For example, to formulate your hypothesis (step 4), you need to know your research population (step 5).

Figure 5 In this section of the guide, you will learn about the steps involved in planning your investigation

STEP 1 Create a logbook

You will need to use a logbook when completing this investigation. The exact structure and content of your logbook will vary depending on what your teacher expects, so make sure you check with them before starting this step.

The purpose of the logbook is to authenticate the work you complete in collecting your primary data. It can also be used to keep track of all the work you complete, which can then be compiled when you present your findings.

This guide contains numerous activities that can be completed in your logbook.

STEP 2 Formulate a research question

Before you start designing and conducting your practical investigation, you first need to decide what you want to investigate. To do this, you need to formulate a research question. This research question needs to be related to mental processes and psychological functioning, which has been specified by VCAA. You may have freedom in what you investigate, or your teacher may specify that you need to focus on either mental processes or psychological functioning.

To formulate your research question, it is a good idea to look through the concepts and topics you have learnt in Unit 3 and Unit 4 and see what content, relating to mental processes or psychological functioning, interests you the most. You can also take the approach researchers usually take, which involves analysing the existing psychological literature to formulate a research question. This may involve finding a slightly different angle to approach a certain topic. In contrast, you may have an alternate model or theory to explain an aspect of mental processes, and choose to investigate this.

EXAMPLE

The research question we will investigate as an example is

‘How does exposure to artificial blue light impact sleep quality?’

This question has been formulated from content in lesson **7C Improving sleep**, which you learnt in Unit 4, Area of Study 1.

USEFUL TIP

You should take note of any useful psychological studies or research that you come across during this step. This will enable you to refer to previous theories and research in the introduction and discussion sections when you write up the findings from your study. You will also need to reference these studies.

LESSON LINK

In lesson **1A Introduction to research**, you learnt that controlled variables are variables other than the IV that a researcher holds constant (controls) in an investigation. This is done to ensure that changes in the DV are solely due to changes in the IV. In your own study, you may choose to implement controlled variables if it is appropriate.

STEP 3 Investigate relevant psychological studies

Now that you have formulated a research question, it is important to investigate the relevant existing psychological literature. Through your research, you may discover a popular or universally accepted method or test used to measure a psychological phenomenon that you can include or revise for your own study.

This research will help you during the following steps that outline when you are to formulate a hypothesis, decide on a research design, design your method, and consider any ethical implications of your research.

If you find multiple scientific research studies that present contradictory findings, it is important to note this down. These contradictory findings could have occurred for several reasons, such as different measures or inconsistent sample sizes being used in different studies, as well as errors in the study. The notes you have on uncertainties in the research could be used in the introduction section of your write-up when outlining a reason as to why you are undertaking the investigation. You could also discuss whether any information in the psychological studies you looked at challenge or are inconsistent with existing theories or models in the field of psychology.

STEP 4 Formulate an aim and hypothesis

In lesson **1A Introduction to research**, you learnt about aims and hypotheses, and how these are distinct from models and theories. This involved learning that a/an:

- aim is a statement outlining the purpose of an investigation.
- hypothesis is a testable prediction about the outcome of an investigation.
- variable is a condition or component of an experiment that can be measured or manipulated.

For your investigation, you will first need to formulate your own aim.

- Your aim should be directly informed by your research question.
- For example, ‘To investigate the impact of exposure to artificial blue light on sleep quality’.

You then need to identify the independent (IV) and dependent variables (DV) in your study. The IV is manipulated by the researcher, while the DV is measured. It is important for you to operationalise these variables so that you know exactly how these variables will be measured/used in the study. This is not only important to plan for your study, but also to include in your hypothesis, and so future researchers can replicate your study.

Finally, you need to formulate your hypothesis. Your hypothesis needs to outline your IV and DV and outline a clear predicted direction of the relationship between the variables. You can also choose to specify the population of interest, although it is not always necessary. The link between the aim and hypothesis is illustrated in figure 6.

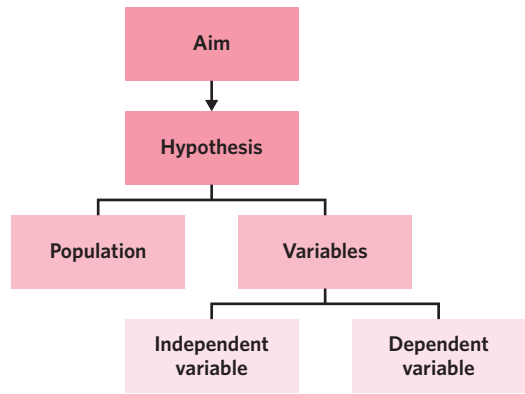


Figure 6 Components you need to outline at this stage of planning your investigation

EXAMPLE

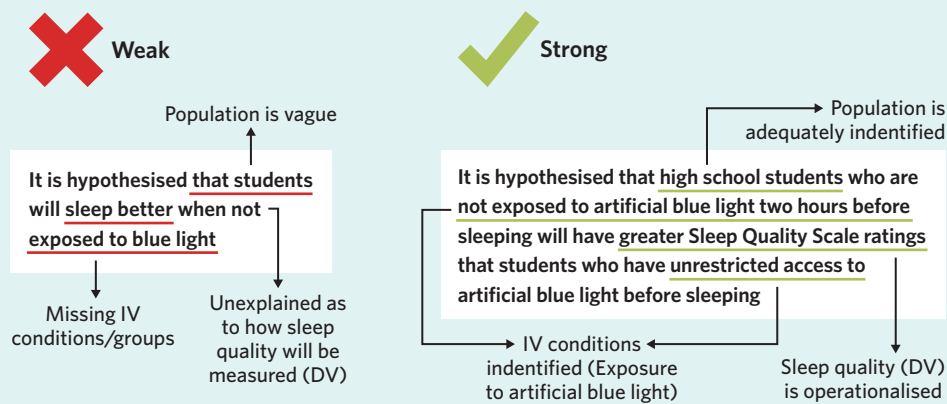


Figure 7 A weak hypothesis compared to a strong hypothesis

As can be seen in figure 7, the strong hypothesis is much clearer and more specific when compared to the weak hypothesis. This makes it easier to measure because there is a clearly outlined dependent variable (DV), a specified population, and both conditions (control and experimental) or groups relevant to the IV, have been identified. Due to this clearer hypothesis, it will be easier for other researchers to replicate the study. Importantly, it also starts with 'It is hypothesised...'

STEP 5 Decide on the research design

Now that you have formulated a hypothesis, there are multiple decisions that you need to make about the research design. If you need a refresher on any of these concepts, return to **Chapter 1 Key science skills**. The decisions you have to make include:

- What **investigation methodology** will you use?
 - The different types of investigation methodologies include, but are not limited to, identification and classification, controlled experiments, correlational studies, fieldwork, case studies, modelling, and simulation.
 - It is important to consider what is feasible for you to do. For example, you would not be able to conduct a study over multiple years for the purpose of this assessment task. In fact, you are the most likely to conduct a correlational study or controlled experiment in this assessment task.
 - In lesson **1B Scientific research methodologies**, you learnt about the advantages and disadvantages of the different investigation methodologies. It is important that you consider these and help the advantages and disadvantages to inform the design of your study, as well as mention any advantages or disadvantages in the write-up of your investigation.
- What **controlled experimental design** will you select (if you choose to conduct an experiment)?
 - This will involve evaluating whether it is most appropriate to use a within-subjects design, a between-groups design, or a mixed design.
- What will the **size of your sample** be?
 - It is important to again consider what is feasible here. For example, it is unlikely that you will be able to interview 100 participants due to time constraints.
 - In contrast, if you only had one or two participants, your sample size is likely to be too small to draw conclusions and generalise the findings from your investigation.
- What **sampling procedure** will you use?
 - Are you able to use random or stratified sampling, or is it best to use convenience sampling?
 - It is important to consider the advantages and disadvantages of the different sampling techniques, which you learnt about in lesson **1C Population, sample, and sampling**.
- What **allocation method** will you use?
 - Are you able to randomly allocate your participants into the conditions?

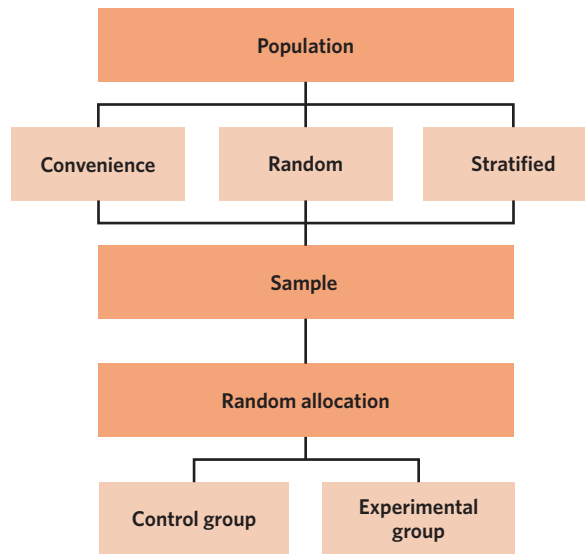


Figure 8 Components you need to outline at this stage of planning your investigation. These components are relevant to a controlled experimental design

It is important to consider the strengths and limitations of each decision you make for your practical investigation so that you can discuss them in your scientific poster.

STEP 6 Design the methodology

In lesson **1D Preventing error and bias**, you learnt about standardised instructions and procedures. It is vital to have set instructions and procedures before conducting your investigation to ensure that all participants have similar experiences during the study, minimising extraneous and confounding variables.

To ensure standardised instructions and procedures are used, it is important to outline your method and decide how you will collect the data from the study. The main two areas you need to consider when making decisions about your method are materials and procedure. The procedure is best outlined as a step-by-step guide on what you will instruct your participants to do. These instructions need to be clear so that you can follow them closely for each participant, and so that researchers can repeat your study in the future and obtain similar results (reproducibility). Considerations relating to the materials you intend to use and the design of your procedure are outlined in table 3.

Table 3 Considerations relating to materials and procedures

| Considerations | |
|------------------|--|
| Materials | <ul style="list-style-type: none"> • Have you developed an informed consent sheet? • Do the questionnaires/rating scales you are planning to use accurately measure what you are trying to measure (internal validity), and do you have the pens/pencils needed to fill these in? • Are there any materials needed to record data, e.g. timer or camera? • Are there any other materials needed for the investigation? |
| Procedure | <ul style="list-style-type: none"> • Are the instructions standardised? The more standardised the instructions, the less likely it is that there will be confounding variables. • Are the instructions and methods of measurement clearly outlined? Having clear steps ensures that the study is able to be replicated in the future. • Have you outlined the difference in procedure between the control and experimental group/s? It is important to clearly outline this so that your procedure is easy to follow. |

Another important component of the method is the participants section. However, you should have made most of these decisions in step 5. It is important to consider demographic information that you may need to collect from your participants to include in your write-up (such as their age, year level, gender, etc.). You may include instructions at the start of your method to collect this information from the participants.

STEP 7 Decide on a data collection and generation method

There are multiple decisions you need to make about how you will collect and generate your data from the investigation. If you need a refresher on these methods, return to lesson **1E Organising and interpreting data**. Some of the questions you will have to consider include:

- Will the data collected be subjective or objective? Which type of data will enable you to best answer your research question?
- How will I collect this data? Will it be from a rating scale or scores from an observation of behaviour?
- How will I record this data? Will I write these down during the investigation, or after? If recording the data afterwards, how do I ensure the accuracy of the data I capture?
- How will you process and organise the quantitative data collected? Will I calculate measures of central tendency (mean, median, mode) or variability (standard deviation)? If so, does the data I collected allow that?
- Will I be able to easily present and interpret this data in my scientific poster?

STEP 8 Consider ethical guidelines and any potential errors or biases

Before conducting your investigation, you need to consider any ethical concepts and guidelines that are relevant to your study, as well as any potential errors and biases which may arise.

When considering the ethics of your investigation, it is important for you to draw on the information that you learnt in lesson **1G Ethical considerations**, as well as the health and safety guidelines you learnt about earlier in this guide. If you need a refresher on these concepts, make sure to return to these sections before considering your own investigation. Some questions related to ethical concepts that you should ask yourself before conducting your practical investigation are outlined in table 4.

Table 4 The main ethical concepts

| Ethical concept | Questions to ask before conducting your study |
|-------------------------------------|---|
| Respect for human beings | <ul style="list-style-type: none"> • Have I provided the participants with as much information about the nature and risks of the study as possible (without compromising my ability to conduct the study)? • Have I ensured that individuals are not coerced to participate in the study? • Have I taken the cultural beliefs and practices of my participants into account? • Does the procedure/method I have designed protect the dignity of each participant? |
| Justice | <ul style="list-style-type: none"> • Am I treating all participants in a fair and equal way? • Am I putting any pressure on any of my participants to participate? |
| Beneficence | <ul style="list-style-type: none"> • Have I considered all potential risks that the participants may be exposed to during the study? • Do the benefits of the study outweigh the risks? • Have I attempted to minimise risks to participants as much as possible? |
| Non-maleficence | <ul style="list-style-type: none"> • Will the design or procedure of the study cause harm to any participants? Including social, mental, and emotional harm, as well as physical? |
| Research merit and integrity | <ul style="list-style-type: none"> • Have I taken the time to research previous studies related to my research question to ensure that I will conduct a safe, accurate, and effective practical investigation? • Have I adequately prepared enough before conducting my practical investigation? For example, do you have all your instructions clear and your materials set out? |

LESSON LINK

In lesson **1F Evaluating research**, you learnt about the concepts of accuracy, precision, repeatability, reproducibility, and validity. To ensure these requirements (e.g. to have precise measurements), you need to consider them when deciding on the measures you will use, and your data generation methods, as this is often where you can introduce errors.

You should also consider the following questions:

- Have I considered the no-harm principle and taken adequate steps to ensure that the participants will not experience physical or psychological harm due to my study?
- Have I considered the following? (If the answer is ‘no’ to any of the following ethical guidelines, you may need to make some adjustments to your investigation.)
 - Voluntary participation
 - Informed consent
 - Withdrawal rights
 - Confidentiality
 - Deception
 - Debriefing.

Using all of these ethical concepts and guidelines, you need to consider whether any adjustments need to be made to how you conduct your practical investigation. Even when you do consider the ethics of your study, some things can occur during a study that are unplanned. For example, you may remember when writing up your study that you forgot to debrief one of your participants. This should, of course, be avoided, but accidents can happen. If something like this happens during your investigation, make sure to record this so that you can mention this in your write-up.

USEFUL TIP

One of the most important ethical considerations is to ensure that you have gained informed consent from your participants. If you are using participants under the age of 18, it is important that you gain consent for their participation from a parent or guardian. However, it is also important that you gain assent from participants under the age of 18, which means that they understand the aim, nature, and risks of the study to the best of their ability.



Figure 9 It is important that you gain informed consent from participants before conducting the study

It is also important to consider any errors or biases that may occur and how to prevent these, when possible. In lesson **1D Preventing error and bias**, we learnt that extraneous variables (EVs) are any variables other than the independent variable that may produce unwanted results on the dependent variable in a study. To minimise these unwanted effects you should ask yourself the following questions:

- Have I chosen an appropriate sampling procedure and experimental design to minimise participant-related variables?
- If using a within-subjects design, have I considered whether order effects could be produced? If so, how could I minimise these order effects?
- Have I considered implementing a placebo and potentially a single-blind procedure to minimise the placebo effect?
- Have I considered implementing a double-blind procedure to minimise experimenter expectations or biases?
- Are my instructions and procedures standardised?

It is not always possible to prevent all extraneous variables due to time constraints and limited resources, as well as extraneous variables potentially arising while conducting your investigation. If this is the case, make sure to note this down in your logbook so you can include it in your scientific poster.

Now that you have deliberated the ethical guidelines and any errors or biases which may occur in your investigation, you may need to revise any plans you made in previous steps to accommodate for necessary or relevant changes. For example, after considering experimenter biases, you may have to revise your method (from step 6) to include the use of a double-blind procedure.

Conducting your investigation

It is now time for you to conduct your investigation. It is important that you set aside enough time before your scientific poster or report is due to ensure that you can carry out your research. Depending on your investigation, this may be conducted at your school, your house, or a friend's house.

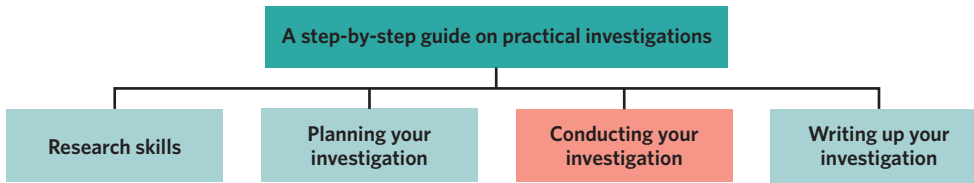


Figure 10 In this section of the guide, you will conduct your investigation

Writing up your investigation

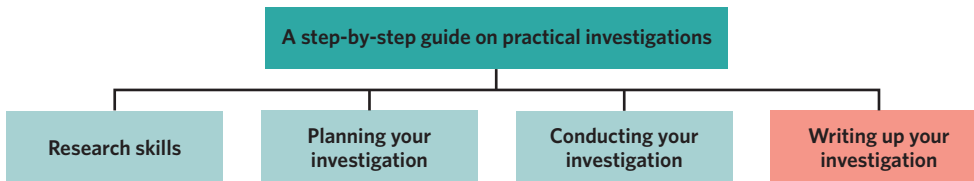


Figure 11 In this section of the guide, you will learn about writing up your investigation

Now that you have planned and conducted your study, it is time to interpret your findings and present them. VCAA has specified that you need to present your work as a scientific poster. In this poster, you must include the sections outlined in figure 12. It has been specified by VCAA that the poster should be 600 words in length, although there is no specification on how these words need to be allocated throughout the poster. Refer to figure 12 as a rough guide on how many words you should spend on each section of your scientific poster. It is important to ensure that your write-up is as concise as possible, while still including all the necessary components.

There is a sample scientific poster at the end of this guide which presents an example of each section of your investigation. Scientific posters are similar to written reports, except they are likely to be more concise and have a more rigid structure that needs to be followed. It is important to remember that this example is only a guide, and your teacher may have different guidelines about what is necessary to include in your write-up.

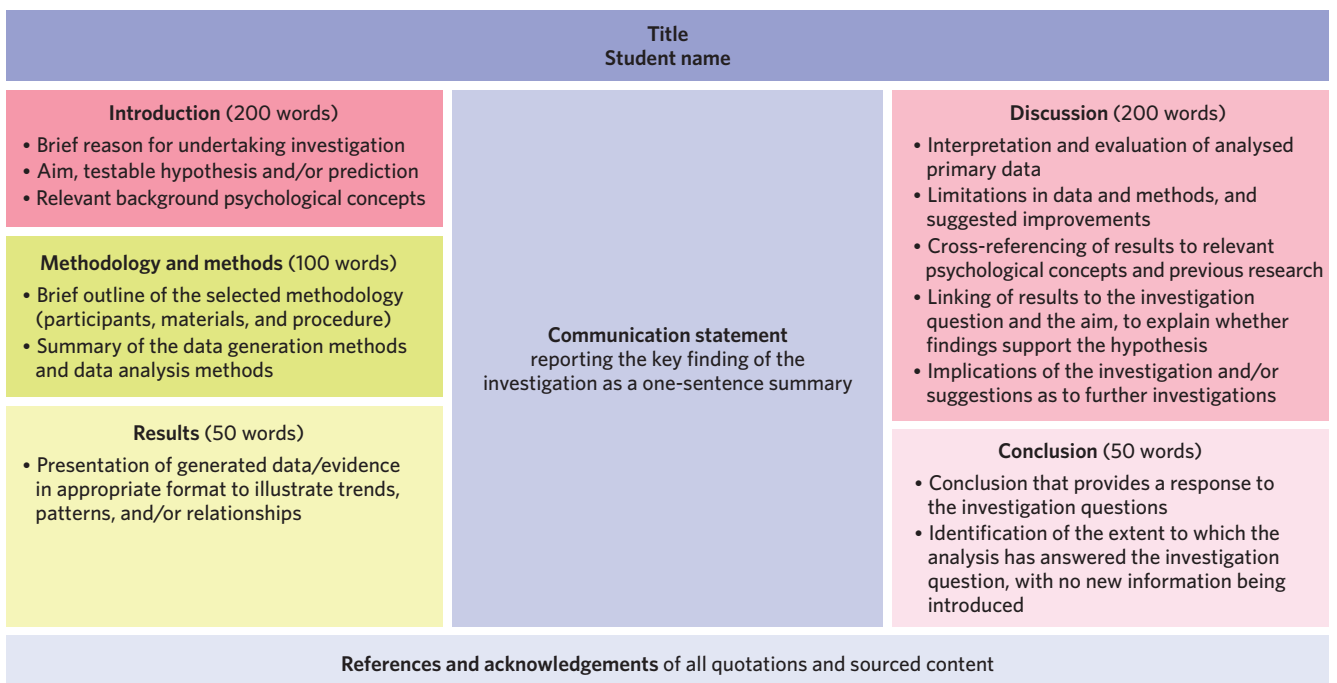


Figure 12 A guide on the content to include in each section of your investigation write-up in the format of a scientific poster (Adapted from VCAA, 2022)

USEFUL TIP

Scientific posters and reports should follow a funnel method. The width of each part of the diagram represents how broad the information in that section is. For example, the start of the introduction should include background information to justify the reason for undertaking the investigation (broad). The end of the introduction is significantly more specific and subsequently, has a narrower band, in which the aim and a testable hypothesis should be outlined. The method and results sections contain highly specific information about the investigation. The discussion also starts specific (hence being narrow on the diagram), as the primary data you have collected is interpreted and evaluated. While the end of the discussion outlines the implications of the investigation, such as implications for the 'real-world' environment or future studies (more broad).

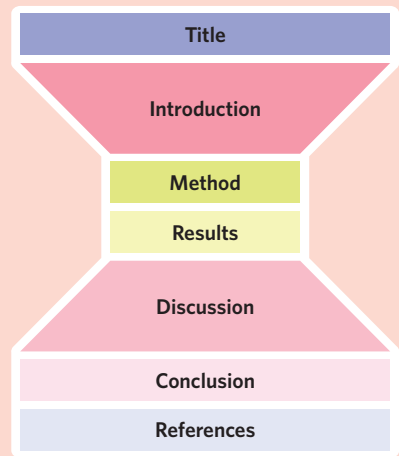


Figure 13 The funnel method of a scientific poster, in which the widest parts of the funnel represent the broadest information, and the narrowest parts represent the most specific information

An example poster, which investigates how exposure to artificial blue light impacts sleep quality, has been provided for you. Each of the sections in the poster will be explored in depth and annotated examples will be provided.

Title

At the top of your scientific poster, you will have to present the title you formulated for your investigation. To formulate your title, you should refer to your research question and make some small adjustments if necessary.

As a general guide, you should try to have your title be 12 words or less. You are aiming to have a short and concise title which outlines the variables of your investigation, but is not overly complex or long. An example of a title could be 'Investigating the effects of (the IV) on (the DV)'.

Introduction

In your introduction you will need to include:

- a brief reason for undertaking the investigation
- relevant background psychological concepts
- an aim, testable hypothesis, and/or prediction.

Reason for undertaking the investigation

Firstly, you need to start with the reasons for undertaking the investigation. This is typically achieved by providing relevant real-world or background information to contextualise your investigation. By contextualising your area of research, you should be indirectly justifying why the investigation is important to conduct. As outlined previously in this guide, your reason for undertaking the investigation could relate to reducing uncertainty in a specific area where scientific information is inconsistent. Your reason for undertaking the investigation should be no more than a few sentences.

Overview of relevant background psychological concepts

In this section, you should define and outline any relevant psychological concepts, as well as outline the findings of relevant past research in this area. This includes defining any key terms. It is important to note the findings of past studies to act as a basis from which you can form your hypothesis and expectations about the findings of your research. In such a way, this section should provide links between the psychological concepts and theories, previous research, and your own investigation.

USEFUL TIP

In chapter 1, you learnt that a hypothesis should always start with 'It was hypothesised...'. This is because hypotheses that refer to a study which has already been conducted need to be phrased in past tense. However, when identifying your hypothesis in your introduction, your hypothesis should be phrased in future tense. Therefore, your hypothesis should start with 'It is hypothesised...'

Identification of research aim and testable hypothesis and/or prediction

You should then state your aim for your study in a sentence (not as a question). You can start your aim with ‘This study/investigation aims to...’.

It is then important to outline your research hypothesis. Remember that this should clearly outline a direction and relevant variables (IV and DV). Depending on your investigation and the instructions of your teacher, you may then provide the operationalised independent and dependent variables in your study.

Method

In your methodology, you will need to:

- briefly outline the selected methodology (participants, materials, and procedure) used to address the research question.
- summarise the data generation methods and data analysis methods.

Participants

You should briefly outline your participants in a sentence or two, and refer to information about their demographic, such as their gender, age, and school (if relevant). The sampling method used to source these participants should also be outlined.

Materials

The overview of the participants should be followed by referring to the materials used to conduct your study. These can be formatted into dot points or a list. It is important to ensure that you provide a detailed list of materials so that your investigation is replicable. That is, so that another researcher is able to repeat your study in the future with the same materials, under the same conditions, and follow the same procedure to ensure that the results aren’t a ‘one-off’.

USEFUL TIP

It may be necessary to include an appendix in your write-up. This involves providing relevant documents, such as the informed consent sheet or a questionnaire that was used. An example of how to refer to an appendix in your scientific poster is ‘Participants were provided with an Empathy Strength questionnaire ‘(see Appendix A)’. The title Appendix A would then be provided on a separate page at the end of your write-up.



Figure 14 Providing documents in an appendix allows you to attach relevant documents to your write-up

USEFUL TIP

To make sure that you include all relevant components when outlining the participants used in your investigation, you can use the acronym SNAG.

- S**ampling method
- N**umber of participants
- A**ge of participants
- G**ender of participants

Procedure

The information included in your procedure should be based on decisions you made during steps 5 to 8 when planning your investigation. This should include the sampling methods used and the steps involved in carrying out the investigation with your participants. This can be formatted by numerical steps or in a paragraph depending on the requirements of the assessment that your teacher has outlined, as well as what works best for your investigation.

You also need to summarise the data generation methods and data analysis methods. This can be included as part of your procedure or can follow your procedure section in a couple of sentences.

Steps taken to minimise errors and consider ethical guidelines (Optional section)

It is optional to include the steps taken to minimise errors and biases as well as to consider ethical guidelines. This is dependent on what your teacher has outlined, as well as if it is relevant to your investigation. You can outline this in a separate paragraph, integrate it into your procedure, or mention it in your discussion.

Results

In this section, you need to provide a presentation of generated data/evidence in an appropriate format to illustrate trends, patterns, and/or relationships. To do so, you will need to use the skills you learnt in lesson **1E Organising and interpreting data**. This includes the skill of visually presenting quantitative data in formats, such as a bar chart or line graph.

USEFUL TIP

As you learnt in chapter 1, it is important that any graphs or other data presentation methods that you use include a clear and relevant title, are labelled correctly (both the horizontal and vertical axis) and clearly outline the units of measurements used in the study. The title of the graph should refer to the variables from both axes, such as 'the effects of (X) on (Y)'. As a general rule, you should also ensure that the independent variable is listed on the horizontal (x) axis and the dependent variable is listed on the vertical (y) axis.

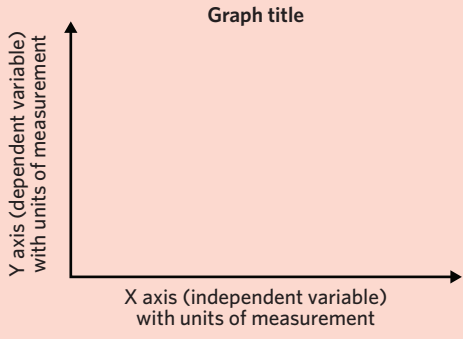


Figure 15 It is important to correctly label and title the method you use to visually present your data

Discussion

The discussion is one of the most important components of your write-up. You will need to include the following:

- interpretation and evaluation of analysed primary data.
- linking of results to the investigation question and aim, to explain whether the investigation data and findings support the hypothesis.
- identification of limitations in data and methods, and suggested improvements.
- cross-referencing of results to relevant psychological concepts and previous research.
- implications of the investigation and/or suggestions as to further investigations that may be undertaken.

Interpretation and evaluation of analysed primary data

Once the data has been meaningfully and clearly presented in the results, it is important to write a short interpretation and evaluation of it. When evaluating your results, it is important to refer to the overall trend, pattern, or relationship between variables. For example, an overall pattern could be that group A had an overall higher score than group B.

Linking of results to the investigation question, aim, and hypothesis

You then need to link your results to your research question. This involves stating whether your results support or reject your hypothesis. For example, you could state 'As shown in the graph, the control group's sleep quality score average being higher (approximately 64) than the experimental group (approximately 48)'. You can then link this to your overall research aim by restating your aim.

It is important to remember that you will not lose marks if your hypothesis is not supported, in fact, this is quite likely to occur due to the conditions of your study, such as having a small sample, as well as little time and resources. Whether or not your hypothesis is supported or not does not make your research 'right' or 'wrong'; both outcomes are valuable in developing your understanding of the psychological concepts you researched.

PSYCHOLOGY EXPLORATION

In recent years, it was discovered that many researchers had engaged in a process called HARKing. This is a deceptive practice in which researchers change their hypothesis after they have conducted their study and analysed their results to ensure that they have a hypothesis which is supported. This practice led to social psychologist Norbert Kerr (1998) coining the term HARKing, which is an acronym that represents 'Hypothesising After the Results are Known'.

The practice of HARKing is an extremely dishonest practice which is now being targeted within scientific research. With this in mind, it is important not to change your hypothesis once you have finished planning your study, but rather to honestly present your data and accurately state whether your hypothesis was or was not supported.

Cross-referencing of results to relevant psychological concepts and previous research

Now that you have stated whether your hypothesis was or was not supported, you need to incorporate the existing research, theories, and psychological concepts that you had outlined in your introduction into the discussion of your investigation. Did your study have similar findings or completely different findings? Why may this be? In this section, you could outline whether your study contributed to minimising uncertainties in the area of research.

Identification of limitations in data and methods, and suggested improvements

Your hypothesis could be rejected due to the limitations in the methods used in the investigation, such as the use of a small sample or inappropriate data generation method. These limitations may involve errors or biases which occurred when conducting your study and may have led to extraneous or confounding variables. It could also relate to any issues with the accuracy, precision, repeatability, reproducibility, and validity of measurements in relation to the investigation. It is important to identify and describe these limitations, and to explain whether these may have influenced the results.

Once these limitations have been identified, you need to suggest potential improvements. These improvements will help contribute to research in the area by providing ideas on how the study could be re-run to support the hypothesis, or to make the study more valid or reliable. These suggestions may also help to explain and minimise remaining uncertainties which arose in the results of your investigation, such as whether the DV was actually affected by the IV or by an extraneous variable in the study.

Implications of the investigation and/or suggestions as to further investigations

Using the limitations you have identified, what suggestions do you have for how to navigate and potentially minimise or eliminate these issues in further studies? You may consider what steps you could take to improve your study. For example, you may identify that the questionnaire you used was designed for older adults, and the use of a revised questionnaire for a teenage sample may be useful and generate more accurate results.

Finally, you should identify any implications that your research has in real life, or in the realm of research. For example, if the findings from your investigation could be applied to how students best learn in the classroom, how marketers should advertise products, and so on.

Conclusion

It is now time to write your conclusion. The conclusion of your investigation write-up serves a similar purpose to conclusions at the end of an essay in that you want to present the main findings of your research, as well as mention any generalisations or implications of the study.

In your conclusion you need to:

- provide a response to the investigation question.
- identify the extent to which the analysis has answered the investigation question, with no new information being introduced.

Response to the investigation question

You should start by restating the aim of your investigation, which was adapted from your research question. For example, 'the study aimed to investigate...'. This should be followed by a statement as to whether your hypothesis was supported or rejected based on your results.

USEFUL TIP

It is important to not use absolute and definitive language in your conclusion, such as 'this has proved that...' and 'it is obvious that...'. This is to ensure that you do not overstate the strength of your research. For example, the use of qualifying language such as 'may have' or 'might have' is more appropriate to use in your conclusion.

Identifying the extent to which the analysis has answered the investigation question

After identifying whether your hypothesis was supported or rejected, you should include a statement as to whether these results can be generalised to the population. If your hypothesis is unable to be supported, you may include a summary sentence as to why this is, which you would have outlined in more depth in your discussion.

LESSON LINK

One of the reasons that your hypothesis cannot be supported may be because the results of your investigation are unable to be applied (or generalised) to the wider research population. You learnt about the concept of generalisability, as well as drawing conclusions, in lesson **1F Evaluating research**. You learnt that to be able to generalise your research findings you need to ensure that your sample is representative of the research population and that the results are valid and reliable. Therefore, it is important that you consider these factors affecting generalisability to inform whether you can generalise your findings or not.

Communication statement

A communication statement reports the key finding of the investigation as a one-sentence summary. As such, other individuals should be able to gauge a sense of your study and its findings just by reading the sentence.

The communication statement should be directly related to your research question. In essence, it should answer the research question by outlining the findings of your study. As such, it should include the independent and dependent variables that relate to your investigation.

Some examples of communication statements include:

- The use of approach strategies was associated with lower levels of stress than the use of avoidance strategies.
- Year eight students were more likely to adopt social protective factors than psychological protective factors when experiencing low levels of mental health and wellbeing.
- Exposure to artificial blue light was associated with poorer sleep quality.

References and acknowledgements

You will need to include a bibliography or reference list at the end of a scientific poster. It is necessary to reference the sources you referred to in your write-up to avoid plagiarism. There are multiple ways in which you can do this, and it is a good idea to ask your teacher what type of bibliography or reference list style is preferred.

No matter which style you use, there are some components that should always be included. It is also important to list the references alphabetically, according to the last name of each author. The components to include are:

- the name of the author of the source
- the year (and potentially the full date) of the source
- the title of the journal article/newspaper article/video/book/interview etc.
- the weblink of any online source.

You may also have some acknowledgments you need to include, such as acknowledging any individuals who assisted you in conducting your investigation by giving up their time or lending you equipment or resources to use. This can be included in a short sentence or two at the end of this section.

Scientific communication conventions

There are certain conventions you need to follow when writing a scientific poster.

Scientific terminology

When writing up your investigation, it is important that you use accurate and appropriate scientific terminology and representations. It is also important that you use terminology in the correct context of the scientific investigation. Some terminology can have different meanings in everyday life compared to within a scientific investigation.

For example, the term 'distress' in the real world may be applied to any form of negative emotions that someone is experiencing. By contrast, the term 'distress' in the context of an investigation on the psychological components of stress refers to a form of stress characterised by a negative psychological state. For the sake of reader understanding, it is important that you use this terminology correctly and outline the terminology in an accurate way which aligns with the context of the investigation.

Standard abbreviations and units of measurement

There are certain standard abbreviations and symbols that can be used in scientific investigations. For example, in psychology research, it is common to use the abbreviation DSM-V when referring to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Similarly, certain units of measurement, including measures of weight, time, and temperature are consistently used in write-ups of scientific reports. These include:

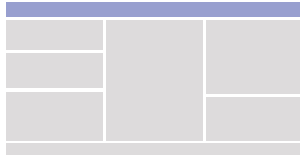
- cm (centimetre)
- ° (degrees celsius)
- kg (kilogram)
- min (minute)

These abbreviations and units of measurement may be particularly helpful in your presentations of data, such as in a graph or your results section.

USEFUL TIP

There are many different styles of referencing. It is important to note that the referencing used in this lesson (including in the example scientific poster) uses APA 7th style referencing. It is important to ask how your teacher wants you to set out your reference list as it may be different to this example.

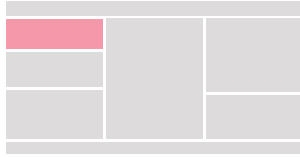
Sample annotated poster



How does exposure to artificial blue light impact sleep quality?

Student name

A concise title that reflects the research question.



Introduction

[A meta-analysis¹] suggested that exposure to blue light can disrupt sleep, leading to poorer sleep quality (Schechter et al., 2020). [Blue light can be produced naturally or artificially, with artificial blue light being emitted from electronic screens²] (Hale et al., 2018; Moderie et al., 2017). [Research shows blue light interferes with the production of the sleep-promoting hormone melatonin, contributing to later bedtimes and poorer sleep quality and quantity.³]

Researchers have suggested that teenagers may be particularly susceptible to the negative effects on sleep quality due to increased usage of electronic screens at night (Hale et al., 2018). [This heightened night-time usage has been suggested to contribute to the adolescent sleep phase disorder⁴] (Hale et al., 2018). [Although many studies have examined the impact of blue light exposure on teenagers, few studies have investigated the extent of this impact, particularly among an Australian sample.⁵]

[This study aims to investigate the impact of blue light exposure on sleep quality.⁶] [It is hypothesised that high school students who are not exposed to artificial blue light two hours before sleeping will have greater Sleep Quality Rating Scale (SQRS) ratings than students who have unrestricted access to artificial blue light before sleeping.⁷]

Findings from a study that provides a strong quality of evidence.¹

Overview of blue light and how it can interfere with sleep quality as a relevant psychological concept in the study.²

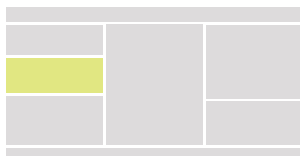
Overview of relevant psychological concepts.³

Identification of a real-world context.⁴

Highlighting a gap in previous research as a reason for undertaking the investigation.⁵

Aim of the study written in present tense.⁶

Testable hypothesis that outlines a relationship between the independent and dependent variables, the direction of this relationship, and the population.⁷



Methodology and methods

[Participants¹]

14 students [(eight females and six males)²] aged between 16 and 17 from Edrolo College, selected using convenience sampling.

[Materials³]

- Informed consent form
- Sleep Quality Rating Scale
- Pen.

[Procedure⁴]

1. Provide participants with the informed consent form and ensure they are made aware of their withdrawal rights.
2. Randomly allocate participants into two conditions (Control = Unrestricted blue light access, Experimental = No exposure to artificial blue light two hours before sleeping).
3. Provide participants with the SQRS copies, and instruct them on how to fill it out every morning after waking for a week.
4. Collect the scale responses from participants after the week.
5. [Calculate the average Sleep Quality Rating Scale scores across the week for each participant before averaging these scores between the two groups. Scores on the scale range from 0 to 84, with greater scores representing poorer sleep quality.⁵]

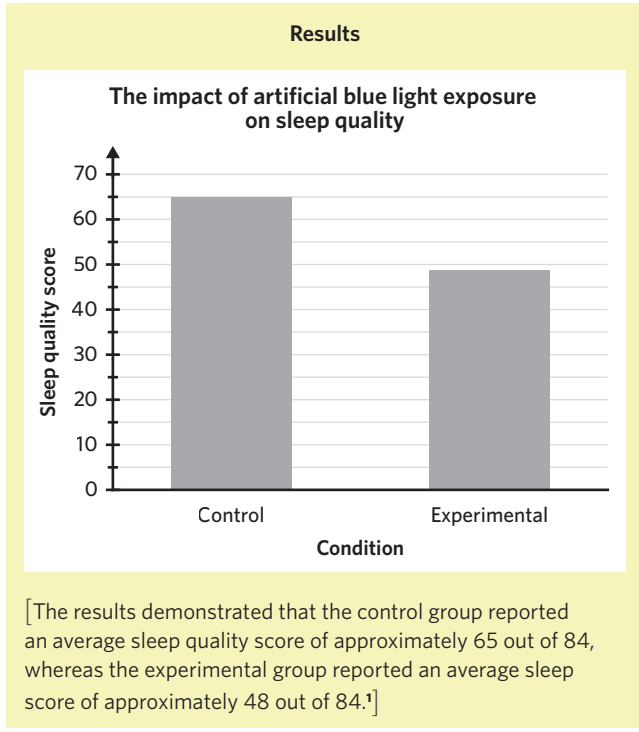
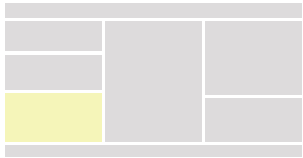
The SNAG acronym is represented here, with the sampling method, number, age, and gender of the participants identified.¹

Use of brackets to identify the genders of the participants in a clear and concise way.²

Identification of the materials used.³

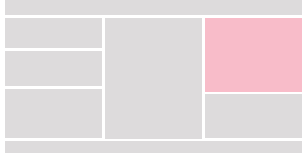
Brief outline of the procedure used to address the research question. Written as a clear, numbered list.⁴

Reflects how data generation and analysis occurred in the study.⁵



Use of a bar chart to visually present the data. Graph includes a clear title. All axes are labeled (horizontal axis represents the IV, while vertical axis represents the DV). A scale is provided on the vertical axis.

Graph is briefly explained in a one sentence summary.¹



Discussion

[The results of the study supported the hypothesis that high school students who are not exposed to artificial blue light two hours before sleeping will have greater sleep quality ratings than students who have unrestricted access.¹][The graph demonstrates this, with the control group's sleep quality score average being higher (approximately 64) than the experimental group (approximately 48).²][The results are congruent with the suggestion from previous studies that exposure to artificial blue light can reduce sleep quality (Hale et al., 2018; Moderie et al., 2017; Schechter et al., 2020).³] The current study expands upon this by examining the difference in sleep quality of Australian teenagers who were exposed to artificial blue light or had unrestricted access two hours before bed. The study demonstrates a difference in sleep quality when exposed to artificial blue light.

[The study contains some limitations.⁴][Firstly, due to using convenience sampling, the sample may be unrepresentative of Australian teenagers, limiting the generalisability of findings.⁵] In the future, the study could be replicated with a larger sample sourced through random sampling. [Future research could add a third condition of participants who wear blue-light blocking glasses (Schechter et al., 2020) for two hours before bed.⁶] These glasses have been suggested as an effective intervention to improve teenagers' sleep quality and [do not require participants to change their routine as much as the participants in the experimental group did.⁷]

Link of results to the investigation question by stating that the findings support the hypothesis.¹

Interpretation of analysed primary data.²

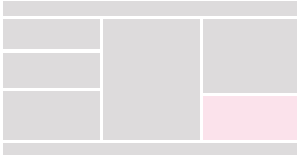
Cross-referencing of results to previous research.³

Identification of limitations.⁴

Identification of errors or biases in the data and method.⁵

The suggestion of potential improvements to avoid or reduce the identified limitations in the data and method.⁶

Identification of implications of the findings.⁷



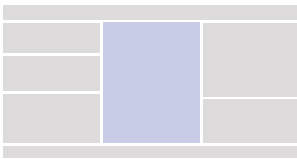
Conclusion

[The study aimed to investigate the impact of blue light exposure on sleep quality¹][and supported the hypothesis.²]
[Replication with a larger and random sample would enable the results of the study to be generalised to Australian teenagers.³]

Identification of the aim.¹

Response to the research question.²

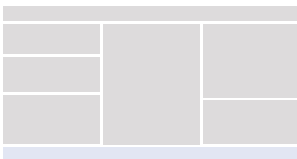
Identification of the extent to which the analysis answered the research question, with a summary as to why the findings cannot be generalised to the population.³



Communication statement

Exposure to artificial blue light was associated with poorer sleep quality.

Findings of the investigation as one sentence.



References

Hale, L., Kirschen, G. W., LeBourgeois, M. K., Gradisar, M., Garrison, M., Montgomery-Downs, H., Kirschen, H., McHale, S. M., Chang, A-M., & Buxton, O, M. (2018). Youth screen media habits and sleep: Sleep-friendly screen-behaviour recommendations for clinicians, educators, and parents. *Child and Adolescent Psychiatric Clinics of North America*, 27(2), 229-245. <https://doi.org/10.1016/j.chc.2017.11.014>

Moderie, C., Van der Maren, S., & Dumont, M. (2017). Circadian phase, dynamics of subjective sleepiness and sensitivity to blue light in young adults complaining of a delayed sleep schedule. *Sleep Medicine*, 34, 148-155. <https://doi.org/10.1016/j.sleep.2017.03.021>

Shechter, A., Quispe, K. A., Barbecho, J. S. M., Slater, C., & Falzon, L. (2020). Interventions to reduce short-wavelength ("blue") light exposure at night and their effects on sleep: A systematic review and meta-analysis. *Sleep advances*, 1. <https://doi.org/10.1093/sleepadvances/zpaa002>

References in APA 7th style.



ANSWERS

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1A Introduction to research

Theory review

1. B. False. *Psychology is a science because its claims meet many of the hallmark features of science including verifiability, objectivity, and provisionality and it often uses the scientific method.*
2. A. True. *Anecdote and personal opinion are non-scientific because they meet features of non-science including that they are not based on empirical evidence, are subject to bias, and are non-objective.*
3. III; IV. *You can have more than one hypothesis and it is the aim, not the hypothesis, that sets out a study's overall objective.*
4. B. In an experiment, researchers want to know the effect of the **independent** variable on the **dependent** variable. *Remember the results of an experiment 'depend' on how the 'dependent' variable is affected.*
5. B. *A controlled variable is used to ensure that effects on the dependent variable can more likely be attributed to manipulation of the independent variable, not something else.*

Assessment skills

Perfect your phrasing

6. A 7. A

Compare and evaluate

8. B 9. B 10. A

Exam-style

Remember and understand

11. C 12. B 13. C 14. D

Apply and analyse

15. A 16. D

17. [To investigate the effects of florally-fragranced hair on levels of attraction.¹]

I have written an aim for the experiment.¹

18. [It was hypothesised that the participants who smoked marijuana before sleep¹] [would have more disjointed content in their dreams²] [than participants who did not smoke marijuana.³]

I have included the independent variable (IV).¹

I have included the dependent variable (DV).²

I have stated a direction (predicted effect of the IV on the DV) for my hypothesis.³

Other acceptable answers include:

- You may have stated an alternative direction for your hypothesis, so long as you correctly identified the IV and DV.

19. a. Independent variable: [the consumption of anxiety medication.¹]
Dependent variable: [feelings of anxiety in individuals with specific phobias.²]

I have identified the independent variable.¹

I have identified dependent variable.²

- b. [Other medication participants are taking.¹]

I have suggested a relevant potential controlled variable for this study.¹

20. [It was hypothesised that teenagers who listen to music for an hour a day¹] [are more likely to²] [experience positive mood than teenagers who listen to music for less than an hour a day.³]

I have stated an independent variable.¹

I have stated a direction for my hypothesis.²

I have stated a dependent variable.³

Other acceptable answers include:

- You may have included a hypothesis that did not operationalise the variables.

1B Scientific research methodologies

Theory review

1. I; II. *Investigation methodologies are any technique or process used at any stage of research to obtain information, not just during a study.*
2. I; II; III. *All three of these things are important considerations to make when selecting investigation methodologies.*
3. A. *A feature of controlled experiments is the active manipulation of independent variables in an attempt to establish a causal relationship between two or more variables.*
4. B. False. *This is false because there are different research designs, within-subjects, between subjects and mixed design, which each have their own unique procedures.*
5. III; IV; V. *Fieldwork is research that involves observation and/or interaction with people in more real-world settings, so controlled experiments and its respective research designs are not examples.*

Assessment skills

Perfect your phrasing

6. A 7. A

Compare and evaluate

8. C 9. B 10. D

Exam-style

Remember and understand

11. B 12. C 13. D

14. [One advantage of case studies is that they allow researchers to obtain rich, qualitative data.¹][One disadvantage of case studies is that their findings cannot be easily generalised to a wider population.²]

I have outlined an advantage of case studies.¹

I have outlined a disadvantage of case studies.²

Apply and analyse

15. C 16. B

17. [In controlled experiments, the researcher plays an active role and must carefully manipulate the independent variable and carefully measure its effect on the dependent variable.¹][In contrast, in direct observation, the researcher is more passive and just observes and records variables without intervention.²]

I have outlined the role of the researcher in controlled experiments.¹

I have compared the role of the researcher in direct observation.²

I have used comparison words, such as 'in comparison'.

18. [Waleed is using a simulation.¹][One advantage of this methodology is that it can be used as an explanatory tool for concepts that are otherwise difficult to examine.²][However, a disadvantage is that simulations are not always accurate or entirely reflective of reality.³]

I have identified Waleed's investigation methodology.¹

I have outlined an advantage of this methodology.²

I have outlined a disadvantage of this methodology.³

I have referred to the character's name (Waleed), and to the scenario.

Other acceptable answers include:

- modelling, including an advantage and disadvantage of this methodology.

Evaluate

19. [Django used a mixed design.¹][We can tell this because there were elements of between-subjects (participants were split into different groups and complete different conditions) and within-subjects designs (the same participants completed two conditions; i.e. the pre- and post-concentration test.²][An advantage of this design is that it allows experimenters to compare results both across experimental conditions and across individuals,³][while a disadvantage is that it is demanding and time consuming for people like Django to conduct.⁴]

I have identified a mixed design.¹

I have explained why a mixed design is by referring to features of the design evident in the scenario.²

I have outlined an advantage of this controlled experiment design.³

I have outlined a disadvantage of this controlled experiment design.⁴

I have referred to the character's name (Django) in my response, and to the scenario.

Questions from multiple lessons

20. A

1C Population, sample and sampling

Theory review

1. B. *The group of people who participate in a study are the sample, not the population.*
2. A. True. *It is true that the size of a sample affects how representative it is, with larger samples being more representative.*
3. B. False. *This is false because the sampling technique used also has bearing on how representative a sample may be.*
4. A. *Convenience sampling is the least likely to create a representative sample, whereas stratified sampling or a large random sample are more likely to.*

Assessment skills

Perfect your phrasing

5. B 6. A 7. A

Compare and evaluate

8. C 9. A 10. C

Exam-style

Remember and understand

11. B 12. B

13. [One way to increase the representativeness of the sample is to have a large sample size¹][and another is to use a sampling procedure, such as random sampling, that reduces bias in the sample.²]

I have listed one way to increase the representativeness of a sample.¹

I have listed another way to increase the representativeness of a sample.²

14. [Random sampling is when a procedure is used that ensures that every member of the population has the same chance of being selected for the sample.¹][For example, putting all members of the population into a random generator and then asking it to generate names for a sample.²][In contrast, stratified sampling involves selecting people from the population in a way that ensures that its strata (subgroups) are proportionally represented in the sample.³][This may involve dividing the population first into strata, and then using a random generator to proportionally select people from each of those strata for the sample.⁴]

- I have outlined what random sampling is.¹

- I have provided an example of random sampling.²

- I have outlined what stratified sampling is.³

- I have provided an example of stratified sampling.⁴

- I have used comparison words in my response, such as 'in contrast'.

Apply and analyse

15. A

16. [One advantage of convenience sampling is that it is time efficient,¹][which is important for Professor Truffles' upcoming deadline with his team.²][However, a limitation is that it may make his sample less representative because it uses no chance or systematic procedure to ensure representativeness³][which may limit Mr Truffle's ability to generalise his findings to the research population of middle-aged Melbourne women.⁴]

- I have stated an advantage of convenience sampling.¹

- I have explained why this is an advantage for Professor Truffles.²

- I have stated a limitation of convenience sampling.³

- I have explained why this is a limitation for Professor Truffles.⁴

- I have referred to the character's name (Professor Truffles) in my response, and to the scenario.

Questions from multiple lessons

17. B 18. C

1D Preventing error and bias

Theory review

- I; III. *Confounding variables, only after examining results after a study, have affected the dependent variable, whereas extraneous variables are just any variable that has the potential to.*
- B. False. *This is false because even if a researcher is aware of all possible extraneous variables, not all can be actively controlled due to constraints like time and resources.*

- B. False. *This is false because the difference between extraneous and confounding variables is not whether they can be controlled, but whether or not they have been shown at the conclusion of an experiment to have systematically and directly affected results.*
- II; IV; V. *The other options are extraneous or confounding variables, rather than ways to prevent extraneous or confounding variables.*

Assessment skills

Perfect your phrasing

5. A 6. B

Compare and evaluate

7. B 8. A 9. A

Exam-style

Remember and understand

10. B 11. C

12. [A single-blind procedure is a procedure in which participants are unaware of the experimental group or condition they have been allocated to.¹][This is used to control for extraneous variables such as participants' expectations.²][In an experiment, it may involve a procedure like assigning participants to either the control or experimental group, but not letting them know which one they are in e.g. by giving one group a placebo and the other the active intervention.³]

- I have defined single-blind procedures.¹

- I have named at least one extraneous variable this controls for.²

- I have provided an example of how a single-blind procedure might control for extraneous variables in an experiment.³

Apply and analyse

13. A 14. C

15. [Doctor Pest should consider situational variables, such as participants' work environment or demands on the day of study.¹][This is an extraneous variable because it could also affect the dependent variable of anxiety symptoms at work.²]

- I have identified one relevant extraneous variable that Doctor Pest should consider.¹

- I have explained how this variable could confound results.²

- I have referred to the character's name (Doctor Pest) in my response, and to the scenario.

Other acceptable answers include:

- You may have identified other extraneous variables, so long as they could be justified as potentially affecting the dependent variable of anxiety symptoms. Examples include, but are not limited to participant differences, such as pre-existing anxiety conditions, amount of sleep and so on.

Questions from multiple lessons

16. A 17. B

1E Organising and interpreting data

Theory review

1. A. True. *When a finding is supported by multiple forms of data, such as both qualitative and quantitative data, it is considered more robust than if it were only supported by one form of data.*
2. B. **Secondary data** is data from others' past research, whereas **primary data** is collected first-hand by a researcher in their current research. *Think of secondary data as coming second-hand from other sources.*
3. B. False. *Personal feelings can be measured and recorded using objective data, such as participants' self-reported ratings on a standardised mood scale.*
4. B. False. *Raw quantitative data often needs to be processed by a researcher so it can more easily be interpreted and communicated.*
5. I; II; III. *Tables and graphs are ways of presenting data as opposed to descriptive statistics.*
6. A. The **mean** is the mathematical average of a data set, whereas the **median** is the middle of a data set that has been ordered from lowest to highest. The mode is the most frequently-occurring value in a data set. *While all measures of central tendency describe the overall 'centre' of a data set, there are differences between them.*
7. I; II; III. *While processing and presenting data can help researchers interpret it, they cannot make conclusions only using these.*

Assessment skills

Data analysis

8. B 9. B 10. A

Perfect your phrasing

11. A

Exam-style

Remember and understand

12. A 13. C

14. [One reason to use the median is when the data is not evenly distributed and so the mean is a less accurate measure of central tendency.¹] [Another reason is when there are outliers, because extreme data values make the mean a less accurate measure of central tendency.²]

I have listed a situation when the median should be used instead of the mean.¹

I have listed another situation when the median should be used instead of the mean.²

Apply and analyse

15. C 16. B

17. [Standard deviation is a measure of variability, expressed as a value that describes the spread of data around the mean.¹] [While the mean just describes the average of a data set, the standard deviation would tell Rhian just how much data values vary around the mean.²]

I have described what is meant by standard deviation.¹

I have described how standard deviation would give Rhian more detail about her data set.²

I have referred to the character's name (Rhian) in my response, and to the scenario.

Questions from multiple lessons

18. D

1F Evaluating research

Theory review

1. B. False. *Researchers must evaluate their research data and investigation methods in order to make high quality conclusions.*
2. B. *Conclusions comment on whether a hypothesis was supported or not, not whether ideas were proved or disproved.*
3. I; II; III. *True value and conclusivity are not concepts that help researchers to evaluate their investigation.*
4. A. **Internal validity** assesses whether a study investigated what it intended to measure, whereas **external validity** assesses whether a study's results can be applied to similar individuals in different settings. *Remember that internal validity concerns the present study only.*
5. A. **Precision** is affected when there are random errors, whereas **accuracy** is affected when there are systematic errors. *Remember that precision concerns how closely a set of measurement values agree with each other, so if precision is lacking, random errors have occurred.*
6. B. False. *Given the nature of some psychological phenomena being a more imprecise construct, such as intelligence, it is not always possible to measure things with certainty.*

Assessment skills

Perfect your phrasing

7. B 8. B

Compare and evaluate

9. A 10. II; III; IV 11. A

Exam-style

Remember and understand

12. B

13. [While repeatability is the extent to which a study's results are the same when it is repeated under identical experimental conditions (e.g. same participants, researcher, and environmental conditions),¹ [reproducibility is the extent to which a study's results are the same when it is repeated under different experimental conditions (e.g. different participants, researcher, or environmental conditions).²]

- I have outlined what repeatability is.¹
-
- I have outlined what reproducibility is.²
-
- I have used comparison words in my response, such as 'whereas'.
-

Apply and analyse

14. C 15. C 16. D

17. [A strength of Stefan's study was that it showed high repeatability¹ [because it produced similar results when conducted again under the same conditions.²][However, a weakness of Stefan's study was that it had low reproducibility³][in that results were not reproduced when the study was conducted again but with different conditions (different setting and researcher), thereby compromising external validity.⁴]

- I have outlined a strength of Stefan's study, referring to repeatability.¹
-
- I have outlined how Stefan's study demonstrated repeatability.²
-
- I have outlined a weakness of Stefan's study, referring to reproducibility.³
-
- I have outlined how Stefan's study did not demonstrate reproducibility.⁴
-
- I have referred to the character's name (Stefan) in my response, and to the scenario.
-

Questions from multiple lessons

18. [Situational variables, such as the context the volleyballers played in (in practice matches on familiar courts),¹ [may have affected the results. This is because these variables may have systematically improved players' performance in games,² [meaning that it may not have been the independent variable (pre-game anxiety levels) that affected the dependent variable (performance), but something else. If this was the case, this means internal validity could have been threatened, potentially compromising Maria's ability to draw a valid conclusion.³]

- I have correctly identified a relevant extraneous variable.¹
-
- I have explained how this extraneous variable may have affected results.²
-
- I have explained how this may have affected Maria's ability to draw a valid conclusion.³
-
- I have referred to the character's name (Maria) in my response, and to the scenario.
-

1G Ethical considerations

Theory review

1. A. **Ethical concepts** refer to the broad moral guiding principles that psychologists and researchers should consider, whereas **ethical guidelines** are the rights research participants have and a researcher must ensure are met. *Another phrase for ethical guidelines is 'participants' rights'.*
2. I; II; V. *Remember that ethical concepts are broad in nature and have to do with values, such as respect.*
3. II; III; V. *Remember that ethical guidelines are rights that participants are entitled to in research.*
4. A. True. *All of these factors influence what is right and wrong with regard to psychological research, issues, and practice.*

Assessment skills

Perfect your phrasing

5. A

Text analysis

6. B 7. C 8. A

Exam-style

Remember and understand

9. B 10. A 11. C
12. [One ethical concept is beneficence.¹][This guides researchers and practitioners to maximise benefits and minimise the risks and harms involved in taking a particular position or course of action.²]
- I have identified one ethical concept.¹
-
- I have outlined this ethical concept.²
-

Other acceptable answers include:

- you may have also identified and outlined the ethical concept of integrity, justice, non-maleficence, or respect.

Apply and analyse

13. D
14. [Doctor Petsopoulos would need to conduct thorough debriefing¹ [at the end of the study to inform participants about which group they were assigned to and tell them the results and intentions of the study.²][He would also need to make sure there is informed consent³][at the start of the study that they may be allocated to a placebo condition and that they will not know whether they are receiving the treatment or not.⁴]

- I have identified debriefing as an ethical guideline Doctor Petsopoulos would need to satisfy.¹

- I have explained how he would satisfy this guideline.²

- I have identified informed consent as another ethical guideline Doctor Petsopoulos would need to satisfy.³

- I have explained how he would satisfy this guideline.⁴

- I have referred to the character's name (Doctor Petsopoulos) and to the scenario in my response.

Questions from multiple lessons

15. D 16. C 17. C

Chapter 1 review

Multiple choice

1. A 2. C 3. B 4. A
5. D

Short answer

6. a. [A non-scientific idea is an idea that is formed without empirical evidence and does not use the methods or principles of science.¹ [For example, old wives tales can be considered to be a non-scientific idea as they are based on opinion and anecdotal evidence.²]
- I have explained what is meant by a non-scientific idea.¹

 - I have provided an example of a non-scientific idea.²

- b. [The use of empirical evidence,¹ [predictions,² [and an aim to be objective would indicate that the idea in the paper is likely scientific.³]
- I have outlined one quality that would suggest the idea is scientific.¹

 - I have outlined another quality that would suggest the idea is scientific.²

 - I have outlined a final quality that would suggest the idea is scientific.³

Other acceptable answers include:

- claims that are testable are included
 - systematic methodologies are included
 - the idea is formed using the methods of science
 - the scientific method is used.
- c. [The scientific method is commonly used when investigating scientific ideas.¹ [The scientific method is a procedure used to obtain knowledge that involves hypothesis formulation, testing, and re-testing through processes of experimentation, observation, measurement and recording.²]

- I have identified the method that is commonly used to investigate scientific ideas.¹

- I have explained this method.²

- d. [In her conclusion, Niam should address the extent to which the data supports or rejects the hypothesis,¹ [whether further evidence is required,² [and whether there are clear recommendations for further studies.³]

- I have identified one consideration that Niam should address.¹

- I have identified another consideration that Niam should address.²

- I have identified a final consideration that Niam should address.³

- I have referred to the character's name (Niam) in my response, and to the scenario.

7. a. [In Pearl's study, the control group would not use any coping strategy,¹ [while the experimental group would use an approach strategy.² [Control groups are beneficial in scientific research as they serve as a baseline to compare the results of the experimental group against.³]

- I have outlined the conditions of the control group.¹

- I have outlined the conditions of the experimental group.²

- I have explained the benefits of using a control group in scientific research.³

- I have referred to the scenario in my response.

- b. [Pearl could use the measure of repeatability to analyse the extent to which successive measurements or studies produce the same results when carried out under identical conditions within a short period of time.¹ [She could also use the measure of reproducibility to analyse the extent to which successive measurements or studies produce the same results when repeated under different conditions.²]

- I have described one measure that could be used.¹

- I have described another measure that could be used.²

- I have referred to the character's name (Pearl) in my response, and to the scenario.

8. Students needed to display that they had a thorough understanding of the question by demonstrating:
- an effectively structured response
 - that all parts of the question had been addressed
 - that psychological terminology had been used in their answer.

In relation to the relevant introductory statements, discussion of the following would be awarded:

- Identification of the aim being to investigate the effects of sleep deprivation on emotional regulation.
- Identification of the independent variable as sleep deprivation and the dependent variable as emotional regulation.
- A hypothesis of the results that includes both levels of the independent variable, dependent variable, the population and a statement of direction (either direction is accepted).

In relation to the methods and procedures of the investigation, discussion of the following would be awarded:

- Identification of the sampling method used by Meadow as convenience sampling.
- The ethical guidelines that would have been followed whilst conducting the study.
- How the variables were operationalised.
- The selection of the most appropriate investigation methodology, which would be a controlled experiment.
- The chosen allocation procedure and the use of experimental and control groups.
- Whether a between subjects, within subjects, or mixed methodology was used.

In relation to the type of data that was collected and how this would be reported, discussion of the following would be awarded:

- Based on the student's proposed design, whether the data collected was quantitative or qualitative and objective or subjective.
- The descriptive statistics that could be reported, based on the student's proposed design.

In relation to the evaluation of the investigation, discussion of the following would be awarded:

- The small sample size of ten people, as it reduces the generalisability of results to the general population. This limitation may be overcome by increasing the sample size so that the sample is more representative of the population.
- The use of convenience sampling as it reduces the generalisability of results to the general population. This limitation may be overcome by using stratified sampling in future research.
- Limitations of using a controlled experiment, such as experimenter effects. This limitation could be overcome by implementing a single-blind or double-blind procedure in future research.
- If a within subjects design was used, the possibility of order effects and how this could be resolved through counterbalancing.
- If a between subjects design was used, the possibility of participant-related variables and how this could be resolved by using a matched participant design.
- Any other potential extraneous or confounding variables relevant to the student's proposed study design.

2A The nervous system

Theory review

1. A. True. *The nervous system is composed of billions of neurons arranged in neural pathways along which neural messages are transmitted. In this way, the neuron is the basic structural and functional unit of the nervous system.*
2. I; II; IV. *There are three types of neurons: sensory neurons, motor neurons, and interneurons. Central neurons are not a type of neuron.*
3. C. *The two major divisions of the nervous system are the central nervous system and the peripheral nervous system. The parasympathetic nervous system is a division of the autonomic nervous system, which is a division of the peripheral nervous system.*
4. B. False. *It is true that the brain and the spinal cord are made up of neurons. However, these components of the central nervous system are made up of interneurons, not sensory neurons and motor neurons.*
5. A. The somatic nervous system comprises afferent (**sensory**) neural pathways and efferent (**motor**) neural pathways. *The 'SAME' acronym may help you remember that 'sensory' and 'afferent' are words that can be used interchangeably, as can the words 'motor' and 'efferent'.*
6. B. False. *This statement is designed to trick you! The autonomic nervous system can be further divided into the sympathetic nervous system and the parasympathetic nervous system. There is no such thing as the automatic nervous system.*
7. II; III; IV. *Visceral muscles, organs, and glands are predominantly self-regulating and do not require conscious control. Therefore, leg muscles, which can be moved voluntarily, are an example of skeletal muscles, rather than visceral muscles.*

Assessment skills

Compare and evaluate

8. C 9. D 10. A 11. B
12. B

Exam-style

Remember and understand

13. D
14. [Skeletal muscles are muscles connected to the skeleton that carry out voluntary motor movements.¹][The somatic nervous system, which is a division of the peripheral nervous system, controls skeletal muscles.²]

I have explained what is meant by skeletal muscles.¹

I have identified the somatic nervous system as the division of the nervous system that controls skeletal muscles.²

Note: It is not appropriate to identify the peripheral nervous system as the division of the nervous system that controls skeletal muscles. Despite the somatic nervous system being a division of the peripheral nervous system, so is the autonomic nervous system, which does not control skeletal muscles. Therefore, you must specifically identify the somatic nervous system.

15. [The sympathetic nervous system and the parasympathetic nervous system are both divisions of the autonomic nervous system.¹][However, the sympathetic nervous system prepares the body to respond to a threat or stressor, whereas the parasympathetic nervous system returns the body to optimal and balanced functioning once the threat or stressor is no longer present.²]

I have described one similarity between the sympathetic nervous system and the parasympathetic nervous system.¹

I have described one difference between the sympathetic nervous system and the parasympathetic nervous system.²

I have used comparison words, such as 'whereas'.

Other acceptable answers include:

- other similarities between the sympathetic nervous system and the parasympathetic nervous system, such as that both involve the activity of visceral muscles, organs, and glands.
- other differences between the sympathetic nervous system and the parasympathetic nervous system, such as that the sympathetic nervous system activates visceral muscles, organs, and glands, whereas the parasympathetic nervous system maintains visceral muscles, organs, and glands at optimal and balanced functioning.

Apply and analyse

16. A
17. [A neuron is a nerve cell that receives and transmits neural information.¹][There are three types of neurons, which are interneurons, sensory neurons, and motor neurons.²][The neuron is the basic structural and functional unit of the nervous system. This is because the nervous system is made up of neurons arranged in neural pathways.³][It is along these neural pathways that both sensory and motor neural messages are transmitted around the body, enabling various divisions of the nervous system to communicate with one another.⁴]

I have explained what a neuron is.¹

I have explained what a neuron is in further detail by providing another point of information.²

I have explained the role of the neuron in the nervous system.³

I have explained the role of the neuron in the nervous system in further detail by providing another point of information.⁴

18. [Ava's autonomic nervous system is activated as she watches the scary movie.¹][This is because she feels her pounding heart and nauseous stomach, and these are visceral organs that are controlled by the autonomic nervous system.²][Furthermore, Ava's somatic nervous system is activated as she watches the scary movie.³][This is because she consciously decides to pick up the remote, which is a voluntary motor movement of the skeletal muscles in the hand, which are controlled by the somatic nervous system.⁴]

✓ ✗ I have identified the autonomic nervous system as being activated as Ava watches the scary movie.¹

✓ ✗ I have justified my response, with reference to the scenario.²

✓ ✗ I have identified the somatic nervous system as being activated as Ava watches the scary movie.³

✓ ✗ I have justified my response, with reference to the scenario.⁴

✓ ✗ I have referred to the character's name (Ava) in my response, and to the scenario.

Other acceptable answers include:

- the central nervous system, which coordinated the mental process when Ava made the decision to stop watching the scary movie
- the sympathetic nervous system, which was activated when Ava experienced heightened bodily arousal while watching the scary movie.

2B Conscious and unconscious responses

Theory review

1. B. Conscious responses are deliberate and voluntary actions that are initiated by the **brain**. *Unlike unconscious responses, which are not initiated by the brain, conscious responses are initiated by the brain and performed by the body.*
2. I; IV. *The somatic nervous system and the central nervous system interact to enable conscious responses to internal and external sensory stimuli.*
3. A. True. *As the name suggests, unconscious responses are performed unconsciously, meaning they are performed automatically and involuntarily in response to sensory stimuli.*
4. B. Unconscious **parasympathetic** responses occur to maintain optimal and balanced functioning. *This is in contrast to sympathetic responses that occur to energise the body, preparing it to confront a threat or stressor. Both parasympathetic and sympathetic responses are unconscious physiological responses.*
5. II; III. *Options I and IV are parasympathetic responses, rather than sympathetic responses. When the sympathetic nervous system is dominant, physiological responses occur to energise the body (heart rate increases) and conserve energy (bladder relaxes).*
6. B. *The spinal reflex occurs when sensory receptors detect a dangerous sensory stimulus. An extremely hot surface is a dangerous stimulus that requires an automatic and immediate response, whereas a warm surface is a neutral stimulus that can be consciously responded to without causing harm to the person.*
7. C. The spinal reflex is initiated by **interneurons** in the spinal cord. *Given that the spinal cord is made up of interneurons, this is the type of neuron that initiates the spinal reflex in the spinal cord.*
8. B. False. *Although the brain does become aware of the sensation that triggered the spinal reflex, this occurs after spinal reflex response has been initiated by interneurons in the spinal cord independently of the brain. Therefore, the spinal reflex is an unconscious response.*

Assessment skills

Data analysis

9. C 10. B 11. A 12. A
13. D 14. B

Exam-style

Remember and understand

15. C 16. B 17. D

18. [Both conscious motor responses to sensory stimuli and the spinal reflex are initiated by the central nervous system.¹] [However, these responses are initiated by different components of the central nervous system, with conscious motor responses being initiated by the brain and the spinal reflex being initiated by the spinal cord.²]

✓ ✗ I have outlined one similarity between conscious motor responses to sensory stimuli and the spinal reflex.¹

✓ ✗ I have outlined one difference between conscious motor responses to sensory stimuli and the spinal reflex.²

Other acceptable answers include:

- other similarities between conscious motor responses to sensory stimuli and the spinal reflex, such as that both responses respond to sensory stimuli.
 - other differences between conscious motor responses to sensory stimuli and the spinal reflex, such as that conscious motor responses occur voluntarily, whereas the spinal reflex occurs involuntarily and unconsciously.
19. [Sensory receptors on the person's skin would detect the sensation of the cold weather.¹] [This sensory information would be transmitted via sensory neural pathways in the somatic nervous system and afferent tracts in the spinal cord to the brain.²] [The brain would receive and process this sensory neural message of the cold weather, and coordinate and initiate a conscious motor response to put on a jacket.³] [This motor neural message would be transmitted via efferent tracts in the spinal cord and motor neural pathways in the somatic nervous system to skeletal muscles, which would carry out the motor movement of putting on a jacket in response to the cold weather.⁴]
- ✓ ✗ I have described how the sensory stimulus (cold weather) was detected by sensory receptors.¹
- ✓ ✗ I have described how this sensory neural message was sent to the brain.²
- ✓ ✗ I have described how the brain coordinates and initiates a motor response (putting on a jacket).³
- ✓ ✗ I have described how this motor neural message was sent to skeletal muscles, which carry out the motor movement.⁴

Apply and analyse

20. A

21. [An example of a conscious response is when Jesse decides to walk away from his English teacher.¹] [This is because Jesse makes the conscious decision to deliberately avoid his English teacher. He voluntarily and intentionally walks away in response to seeing his English teacher.²]

I have identified an example of a conscious response.¹

I have justified why this is an example of a conscious response.²

I have referred to the character's name (Jesse) in my response, and to the scenario.

22. a. [Division: Somatic nervous system.¹] [Response: Conscious motor response.²]

I have identified a division of the nervous system that was involved when Violet brushed the ant off her leg.¹

I have identified that Violet brushing the ant off her leg is a conscious response.²

Other acceptable answers include:

- the central nervous system was also involved when Violet brushed the ant off her leg.

b. [The spinal reflex is the response that occurred when Violet kicked out her leg.¹] [The spinal reflex is an unconscious response to sensory stimuli that is initiated by interneurons in the spinal cord independently of the brain.²] [Because Violet involuntarily kicked out her leg before consciously registering the stinging sensation, this action was automatically initiated by the spinal cord, not the brain.³]

I have named the spinal reflex as the response that occurred when Violet kicked out her leg.¹

I have explained what the spinal reflex is.²

I have explained how Violet kicking out her leg is an example of the spinal reflex.³

I have referred to the character's name (Violet) in my response, and to the scenario.

Questions from multiple lessons

23. D

24. C

2C Neurotransmitters and neuromodulators

Theory review

- A. The transmission of neural information across a neural synapse occurs **chemically**. *Synaptic transmission is a chemical process because it involves the release of neurochemicals, which are chemical substances, into the neural synapse.*
- I; III; IV. *The neural synapse is the region that includes the axon terminals of the presynaptic neuron, the synaptic gap, and the dendrites of the postsynaptic neuron. Given that the axon terminals release neurochemicals into the synaptic gap, they are on the presynaptic 'releasing' neuron, not the postsynaptic 'receiving' neuron.*
- B. False. *A neurochemical can only bind to its corresponding receptor site that matches its specific molecular structure. It cannot bind to the receptor sites of other neurochemicals, just as other neurochemicals cannot bind to its receptor site.*
- C. *In this lesson, you learnt about neurotransmitters and neuromodulators, which are chemical substances released into the neural synapse by the presynaptic neuron. Therefore, although you did not learn about hormones in this lesson, it is the only possible answer by the process of elimination.*
- A. A neurotransmitter with an excitatory effect **increases** the likelihood of the postsynaptic neuron firing an action potential. *Excitatory effects 'excite' the neuron, making it more likely to fire an action potential. By contrast, inhibitory effects 'inhibit' the neuron, making it less likely to fire an action potential.*
- B. False. *While inhibitory effects do slow neural transmission, they are necessary for optimal brain functioning. Without inhibitory effects counterbalancing excitatory effects in the brain, postsynaptic neurons may fire uncontrollably, which may contribute to anxiety or seizures.*
- II; IV. *Dopamine and serotonin are neuromodulators that affect multiple postsynaptic neurons, whereas glutamate and GABA are neurotransmitters that affect one or two postsynaptic neurons.*

Assessment skills

Compare and evaluate

8. C 9. C 10. A 11. B

Text analysis

12. B 13. D

Exam-style

Remember and understand

14. A 15. B

16. [Both neurotransmitters and neuromodulators must bind to their specific receptor sites to have their effect on a postsynaptic neuron.¹] [However, neuromodulators have their effect on multiple postsynaptic neurons, whereas neurotransmitters only have their effect on one or two postsynaptic neurons.²]

✓ ✗ I have explained one similarity between neurotransmitters and neuromodulators.¹

✓ ✗ I have explained one difference between neurotransmitters and neuromodulators.²

Other acceptable answers include:

- other similarities between neurotransmitters and neuromodulators, such as that they are both released into the neural synapse by the presynaptic neuron.
- other differences between neurotransmitters and neuromodulators, such as that neuromodulators influence neural activity on a larger and slower scale than neurotransmitters.

17. [Serotonin has an important role in regulating mood, with appropriate levels of serotonin in the brain promoting positive and stable moods.¹] [Furthermore, serotonin has an important role in regulating the sleep-wake cycle, influencing the quality and quantity of sleep at night, and feelings of alertness and wakefulness during the day.²]

✓ ✗ I have outlined a role of serotonin in functioning.¹

✓ ✗ I have outlined another role of serotonin in functioning.²

18. [Glutamate is released from the axon terminals of the presynaptic neuron into the synaptic gap.¹] [Glutamate binds to corresponding receptor sites on the dendrites of the postsynaptic neuron that match its specific molecular structure.²] [Once bound, glutamate can successfully have its excitatory effect on the postsynaptic neuron, making it more likely to fire an action potential.³]

✓ ✗ I have described how glutamate is released into the synaptic gap.¹

✓ ✗ I have described how glutamate binds to corresponding receptor sites.²

✓ ✗ I have described how glutamate has its excitatory effect on the postsynaptic neuron.³

Apply and analyse

19. D 20. C

21. [Dopamine is a neuromodulator that is released when a person does a behaviour that has a rewarding or pleasurable consequence.¹] [These behaviours are consequently more likely to be repeated as the person attempts to experience the pleasurable reward again, triggering the release of dopamine once again.²] [This is how dopamine contributes to addiction by being released when a person engages in addictive behaviours, such as gambling and drug use, and motivating them to repeat the behaviour.³]

✓ ✗ I have explained that dopamine is released when a person does a behaviour that has a rewarding or pleasurable consequence.¹

✓ ✗ I have explained how behaviours that trigger the release of dopamine are more likely to be repeated.²

✓ ✗ I have explained how dopamine may contribute to addiction.³

Evaluate

22. [I agree with the statement that both excitatory and inhibitory effects are important for optimal brain functioning.¹] [Without excitatory effects counterbalancing inhibitory effects, postsynaptic neurons in neural pathways may be inadequately stimulated and activated, which may cause learning and concentration difficulties.²] [Conversely, without inhibitory effects counterbalancing excitatory effects, postsynaptic neurons in neural pathways may fire uncontrollably, which may cause anxiety and seizures.³]

✓ ✗ I have agreed with the statement that both excitatory and inhibitory effects are important for optimal brain functioning.¹

✓ ✗ I have justified my position, with reference to the importance of excitatory effects for optimal brain functioning.²

✓ ✗ I have justified my position, with reference to the importance of inhibitory effects for optimal brain functioning.³

Questions from multiple lessons

23. a. [GABA¹] [is likely at lower levels than normal in Gabriella's brain.²]

✓ ✗ I have named GABA as the dysfunctional neurochemical in Gabriella's brain.¹

✓ ✗ I have identified that GABA is likely at lower levels than normal in Gabriella's brain.²

✓ ✗ I have referred to the character's name (Gabriella) in my response, and to the scenario.

b. [Sympathetic nervous system.¹]

✓ ✗ I have identified the sympathetic nervous system as the division of the autonomic nervous system that was likely activated when Gabriella was reminded about the upcoming assessment.¹

2D Synaptic plasticity

Theory review

1. A. True. *Neural synapses in your brain can physically change in response to the experiences that you have, learn from, and remember. This relates to synaptic plasticity, which is the fundamental mechanism of learning and memory.*
2. I; III. *Sprouting, rerouting, and pruning are the three mechanisms of synaptic plasticity that involve changes being made to a synaptic connection between two neurons.*
3. B. False. *While pruning does eliminate synaptic connections, it does not eliminate useful synaptic connections that are regularly activated. Instead, pruning removes inadequately activated synaptic connections to accommodate more useful synaptic connections, which positively impacts brain functioning.*

4. A. Long-term potentiation and long-term depression respectively involve the **strengthening** and **weakening** of synaptic connections between neurons. *Long-term potentiation strengthens synaptic connections that are regularly activated, whereas long-term depression weakens synaptic connections that are not regularly activated.*
5. B. Long-term depression **decreases** the efficiency of synaptic transmission along a neural pathway. *This is because the weakening of synaptic connections makes postsynaptic neurons less receptive to neural signals from presynaptic neurons and consequently less readily activated.*
6. B. False. *Both long-term potentiation and long-term depression are important for learning and memory. They work together to maintain an optimal number of synaptic connections, and therefore neural pathways, in the brain, ensuring it can effectively encode learnt information and establish new memory traces.*

Assessment skills

Perfect your phrasing

7. B 8. A

Data analysis

9. C 10. A 11. D 12. C

Exam-style

Remember and understand

13. D 14. B
15. [Synaptic plasticity involves synaptic connections changing over time in response to activity or experience.¹] [During learning and memory, neural synapses physically change in response to these experiences, forming, strengthening, or weakening neural pathways to accommodate what has been learnt or remembered. In this way, synaptic plasticity has an important role in learning and memory.²]

I have described synaptic plasticity.¹

I have described the role of synaptic plasticity in learning and memory.²

16. [Both long-term potentiation and long-term depression involve synaptic connections physically changing in response to activity or experience.¹] [However, long-term potentiation involves the strengthening of synaptic connections, whereas long-term depression involves the weakening of synaptic connections.²]

I have outlined one similarity between long-term potentiation and long-term depression.¹

I have outlined one difference between long-term potentiation and long-term depression.²

I have used comparison words, such as 'whereas'.

Other acceptable answers include:

- other similarities between long-term potentiation and long-term depression, such as that both are experience-dependent forms of synaptic plasticity.
- other differences between long-term potentiation and long-term depression, such as that long-term potentiation occurs in response to increased activation of synaptic connections, whereas long-term potentiation occurs in response to decreased activation of synaptic connections.

17. [Long-term depression decreases the number of receptor sites on the dendrites of the postsynaptic neuron.¹] [Furthermore, long-term depression, involves pruning, which decreases the number of synaptic connections between the presynaptic neuron and postsynaptic neuron.²]

I have explained a change that occurs to a neural synapse due to long-term depression.¹

I have explained another change that occurs to a neural synapse due to long-term depression.²

Other acceptable answers include:

- decreased number of dendrites on the postsynaptic neuron
- other changes that occur to a neural synapse due to long-term depression.

Apply and analyse

18. A 19. C 20. D

21. [The role of long-term potentiation is to strengthen synaptic connections between neurons responsible for performing the new typing method that are regularly coactivated as Duncan's employees use the new typing method. This strengthens the memory trace representing the new typing method.¹] [By contrast, the role of long-term depression is to weaken synaptic connections between neurons responsible for performing the old typing method that are not regularly coactivated, as Duncan's employees are no longer using this typing method. This weakens the memory trace representing the old typing method.²]

I have explained the role of long-term potentiation in learning the new typing method.¹

I have explained the role of long-term depression in learning the new typing method.²

I have referred to the characters' names (Duncan's employees) in my response, and to the scenario.

22. [Doctor Holland cannot generalise the results of her experiment to humans¹] [because the sample of rats is not representative of a human population, given that rats are a different species to humans.²]

I have stated that Doctor Holland cannot generalise the results of her experiment to humans.¹

I have justified my response, with reference to the sample not being representative of a human population.²

I have referred to the character's name (Doctor Holland) in my response, and to the scenario.

23. [I disagree with the statement that synaptic plasticity only involves the formation of new synaptic connections.¹][While synaptic plasticity can involve the formation of new synaptic connections through mechanisms, such as sprouting,²][there are forms of synaptic plasticity that do not involve the formation of new synaptic connections. For example, long-term depression involves the weakening of synaptic connections.³]

I have disagreed with the statement that synaptic plasticity only involves the formation of new synaptic connections.¹

I have explained that synaptic plasticity can involve the formation of new synaptic connections.²

I have explained that synaptic plasticity does not always involve the formation of new synaptic connections.³

Questions from multiple lessons

24. C

Chapter 2 review

Multiple choice

1. B 2. A 3. C 4. B
5. D

Short answer

6. [The somatic nervous system and the autonomic nervous system are both divisions of the peripheral nervous system.¹][However, the somatic nervous system controls skeletal muscles, whereas the autonomic nervous system controls visceral muscles, organs, and glands.²]

I have described one similarity between the somatic nervous system and the autonomic nervous system.¹

I have described one difference between the somatic nervous system and the autonomic nervous system.²

I have used comparison words, such as 'whereas'.

Other acceptable answers include:

- other similarities between the somatic nervous system and the autonomic nervous system, such as that both the somatic nervous system and the autonomic nervous system are required to respond to internal and external sensory stimuli.
 - other differences between the somatic nervous system and the autonomic nervous system, such as that the somatic nervous system is involved in conscious responses, such as voluntary motor movements, whereas the autonomic nervous system is involved in unconscious responses, such as sympathetic and parasympathetic responses.
7. [An example of an unconscious response is when Andrew's heart is pounding in his chest right before proposing to Tasha.¹][This is because increased heart rate is an example of an unconscious response of the sympathetic nervous system that occurs involuntarily in response to a threat or stressor. In this scenario, Andrew experiences this physiological response, over which he has no conscious control, during a stressful situation.²]

I have identified an example of an unconscious response.¹

I have justified why this is an example of an unconscious response.²

I have referred to the characters' names (Tasha and Andrew) in my response, and to the scenario.

8. a. [Pruning is the elimination of synaptic connections that are not adequately activated.¹][By contrast, sprouting is the ability of dendrites or axons to develop new extensions or branches, enabling the formation of new synaptic connections.²]

I have explained what is meant by pruning.¹

I have explained what is meant by sprouting.²

I have used comparison words, such as 'by contrast'.

b. [Pruning occurs during long-term depression to weaken synaptic connections in a neural pathway, whereas sprouting occurs during long-term potentiation to form and strengthen synaptic connections in a neural pathway.¹]

I have outlined one difference between pruning and sprouting.¹

I have used comparison words, such as 'whereas'.

9. [Glutamate has an important role in long-term potentiation, which is a form of synaptic plasticity, because its excitatory effects enable the strengthening of synaptic connections.¹]

I have explained a role of glutamate in neurological functioning.¹

Other acceptable answers include:

- having an excitatory effect on the postsynaptic neuron, increasing the likelihood of it firing an action potential
 - enabling learning and memory
 - other roles of glutamate in neurological functioning.
10. [I disagree with the statement that long-term potentiation, but not long-term depression, promotes learning and memory.¹][Long-term potentiation promotes learning and memory by forming and strengthening synaptic connections, and therefore memory traces that represent the information being learned.²][Although long-term depression weakens these synaptic connections, and therefore memory traces formed during learning memory, it only weakens those that are no longer regularly used. This enables new learnt information to be effectively encoded in new memory traces, promoting learning and memory.³]

I have disagreed with the statement that long-term potentiation, but not long-term depression, promotes learning and memory.¹

I have explained that long-term potentiation promotes learning and memory.²

I have explained that long-term depression promotes learning and memory.³

11. [GABA is released from the axon terminals of the presynaptic neuron into the synaptic gap.¹] [GABA binds to corresponding receptor sites on the dendrites of the postsynaptic neuron that match its specific molecular structure.²] [Once bound, GABA can successfully have its inhibitory effect on the postsynaptic neuron, making it less likely to fire an action potential.³]

I have described how GABA is released into the synaptic gap.¹

I have described how GABA binds to corresponding receptor sites.²

I have described how GABA has its inhibitory effect on the postsynaptic neuron.³

12. a. [Long-term depression is the long-lasting and experience-dependent weakening of synaptic connections between neurons that are not regularly coactivated.¹] [When Adam learns to step forward with his right foot as he swings the cricket bat, long-term depression will weaken synaptic connections, and therefore the neural pathway, involved in stepping forward with his left foot due to repeated low-intensity stimulation.²] [This allows for the strengthening of the neural pathway involved in Adam stepping forward with his right foot, enabling him to learn the new technique.³]

I have explained what is meant by long-term depression.¹

I have explained that long-term depression weakens the synaptic connections between neurons involved in stepping forward with his left foot.²

I have explained that long-term depression enables Adam to learn the new technique of stepping forward with his right foot.³

I have referred to the character's name (Adam) in my response, and to the scenario.

b. [Changes that may have occurred to neural synapses between neurons involved in Adam stepping forward with his right foot include an increased number of receptor sites on the dendrites of the postsynaptic neuron¹] [and an increased number of synaptic connections between neurons due to sprouting.²]

I have outlined a change that occurs to neural synapses during long-term potentiation.¹

I have outlined another change that occurs to neural synapses during long-term potentiation.²

I have referred to the character's name (Adam) in my response, and to the scenario.

13. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

In relation to conscious responses, discussion of the following would be awarded:

- Explanation of conscious responses as deliberate and voluntary actions that are intentionally initiated by the brain and performed by the body.
- Identification of the central nervous system and somatic nervous system as divisions of the nervous system involved in conscious responses.
- Identification of Ayalah hitting her brother as an example of a conscious response, and justifying why this is an example of a conscious response.
- Explanation of the steps involved in conscious responses, with reference to the example of Ayalah hitting her brother.

In relation to unconscious responses, discussion of the following would be awarded:

- Explanation of unconscious responses as automatic and involuntary actions that are performed by the body independently of the brain.
- Identification of Ayalah feeling stressed in response to losing her luggage as an example of a physiological response of the autonomic nervous system, specifically the sympathetic nervous system, and justifying why this is an example of an unconscious sympathetic response.
 - Identification of sympathetic responses that Ayalah may have experienced in response to losing her luggage, such as increased heart rate or increased breathing rate.
 - Explanation of the role of the sympathetic nervous system in activating Ayalah's visceral muscles, organs, and glands to prepare her body to respond to the stressor of losing her luggage.
- Identification of Ayalah's luggage being found as an example of a physiological response of the parasympathetic nervous system, and justifying why this is an example of an unconscious parasympathetic response.
 - Explanation of the role of the parasympathetic nervous system in returning Ayalah's visceral muscles, organs, and glands to optimal and balanced functioning once the stressor of losing her luggage is no longer present.
 - Identification of parasympathetic responses that Ayalah may have experienced in response to finding her luggage, such as a steady and regular heart rate or a steady and regular breathing rate.
- Identification of Ayalah being bitten by ants as an example of the spinal reflex response, and justifying why this is an example of an unconscious spinal reflex response.
- Explanation of the steps involved in the spinal reflex response, with reference to the example of Ayalah being bitten by ants.

3A Stress

Theory review

- 1. C. *Stress is a response with both psychological and biological components.*
- 2. A. The psychological component of stress is experienced in **different ways** for different people. *Stress is subjective, with different people often experiencing different psychological responses to the same stressors.*
- 3. I; III. *Eustress and distress demonstrate that stress is subjective because it can involve people experiencing different emotional states in response to the same stressor.*
- 4. B. False. *The flight-or-fight-or-freeze response is a biological response to acute stress, not chronic stress.*
- 5. B. *Cortisol is released to energise the body when it experiences an enduring source of stress, which is referred to as chronic stress.*

Assessment skills

Compare and evaluate

6. D 7. A

Perfect your phrasing

8. A 9. A

Exam-style

Remember and understand

10. C 11. B
12. [Internal stressors are stimuli originating from within a person's body that prompt the stress response.¹][For example, this includes repeatedly worrying about the negative components of a situation (rumination).²][By contrast, external stressors are stimuli originating from outside of a person's body that prompt the stress response.³][For example, this includes an upcoming psychology test at school.⁴]

- I have described internal stressors.¹
- I have provided an example of internal stressors.²
- I have described external stressors.³
- I have provided an example of external stressors.⁴
- I have used comparison words in my response, such as 'by contrast'.

Apply and analyse

13. A 14. C
15. a. [Dillon is experiencing a positive psychological response to a stressor (eustress), as demonstrated by his feelings of motivation.¹][By contrast, Cora is experiencing a negative psychological response to a stressor (distress). As demonstrated by her feeling extremely worried about performing.²]

- I have identified that Dillon is experiencing a positive psychological response during their final rehearsal for the talent show.¹
- I have identified that Cora is experiencing a negative psychological response during their final rehearsal for the talent show.²
- I have used comparison words in my response, such as 'by contrast'.
- I have referred to the characters' names (Dillon and Cora) in my response, and to the scenario.

- b. [While Dillon experienced fight¹][as seen through him singing the song in the face of a stressor (the audience/performance)²][Cora experienced freeze³][as seen in her inability to sing in front of the audience as she stands frozen.⁴]

- I have identified that Dillon experienced fight.¹
- I have provided evidence from the scenario to describe this.²
- I have identified that Cora experienced freeze.³
- I have provided evidence from the scenario to describe this.⁴
- I have referred to the characters' names (Dillon and Cora) in my response, and to the scenario.

Questions from multiple lessons

16. D
17. a. [Cortisol is a hormone that for Zeneb is released to give her energy to initiate and maintain heightened arousal in preparation for the national championship.¹][While cortisol energises the body, such as by increasing blood sugar levels, its prolonged release can also weaken the immune system, which may explain why Zeneb developed a cold after months of concern about the national championship.²]
- I have described the role of cortisol as energising the body when Zeneb is preparing for the national championship.¹
 - I have described the consequence of the prolonged release of cortisol, which is demonstrated by Zeneb developing a cold.²
 - I have referred to the character's name (Zeneb) in my response, and to the scenario.

- b. [Sympathetic nervous system.¹]
- I have identified the sympathetic nervous system.¹

3B Selye's General Adaptation Syndrome

Theory review

- A. Selye's General Adaptation Syndrome explains the stress response from a **physiological** perspective. *This biological model explains stress in terms of the various physiological reactions that a person experiences in response to a persistent stressor, such as the release of stress hormones.*
- B. Selye's General Adaptation Syndrome involves **three** stages and **two** substages. *Alarm reaction, resistance, and exhaustion are the three stages, and shock and counter shock are the two substages of Selye's General Adaptation Syndrome.*
- I; II; III. *The stages and substages of Selye's General Adaptation Syndrome can be explained in terms of levels of resistance to stress, levels of bodily arousal, and/or the ability of the person to cope with the demands of the stressor.*
- B. False. *While shock and counter shock are both part of the alarm reaction stage, shock occurs before counter shock.*
- B. *During resistance, levels of resistance to stress are above normal, meaning the individual can cope with the demands of the initial stressor. Cortisol, which was first released during alarm reaction, has been present in the bloodstream at increased levels for a prolonged period of time.*
- A. True. *A person does not necessarily progress through the entire General Adaptation Syndrome. If the stressor is no longer present, the person stops progressing through the stages and substages.*
- B. False. *Selye's General Adaptation Syndrome is a powerful model for explaining stress from a biological perspective. However, as with any scientific model, it has limitations in its ability to completely capture the complexity of the stress response. For example, it fails to recognise the psychological aspects of stress.*

Assessment skills

Compare and evaluate

8. A 9. C 10. B

Data analysis

11. C 12. A 13. B 14. C

Exam-style

Remember and understand

15. C 16. D
17. [Resistance is the second stage of Selye's General Adaptation Syndrome involving the maintenance of heightened bodily arousal, resulting in an increased ability to cope with the stressor.¹] [In comparison, exhaustion, which is the third stage of Selye's General Adaptation Syndrome, involves the depletion of energy levels and bodily resources. This results in a decreased ability to cope with the stressor.²]

I have described the resistance stage of Selye's General Adaptation Syndrome.¹

I have described the exhaustion stage of Selye's General Adaptation Syndrome.²

I have used comparison words, such as 'in comparison'.

18. [A strength of Selye's General Adaptation Syndrome is that it recognises the relationship between chronic stress and illness.¹] [A limitation of Selye's General Adaptation Syndrome is that the model is based on research that was conducted on rats, reducing its generalisability to the human population.²]

I have outlined one strength of Selye's General Adaptation Syndrome.¹

I have outlined one limitation of Selye's General Adaptation Syndrome.²

Apply and analyse

19. B

20. [Robert is likely experiencing the resistance stage of Selye's General Adaptation Syndrome.¹] [This is because he is coping with the stressor of his diagnosis. Furthermore, his immune system may be weakened, as indicated by the several colds he has recently developed. This indicates that cortisol has been present in his bloodstream for a prolonged period of time, which occurs during resistance.²]

I have identified resistance as the stage of Selye's General Adaptation Syndrome that Robert is likely experiencing.¹

I have justified my response.²

I have referred to the character's name (Robert) in my response, and to the scenario.

21. [Freya was likely in the counter shock substage of the alarm reaction stage.¹] [This is because she felt energised on stage, demonstrating increased arousal, and could sing her part, demonstrating an ability to confront the stressor.²] [By contrast, Silas was likely in the shock substage of the alarm reaction stage.³] [This is because he felt frozen on stage, demonstrating decreased arousal, and could not remember the words to the song, demonstrating an inability to confront the stressor.⁴]

I have identified that Freya was in the counter shock substage of the alarm reaction stage.¹

I have justified my response relating to the stage and substage Freya was in.²

I have identified that Silas was in the shock substage of the alarm reaction stage.³

I have justified my response relating to the stage and substage Silas was in.⁴

I have referred to the characters' names (Freya and Silas) in my response, and to the scenario.

22. a. [Non-random allocation was used to allocate participants to conditions.¹][For Professor Shelby's experiment, this was the only suitable allocation method because participants were allocated to conditions based on sex. If random allocation was used, it is extremely unlikely that all males would be randomly allocated to one condition and all females would be randomly allocated to the other condition.²]

✓ ✗ I have identified non-random allocation as the allocation method used to allocate participants to conditions.¹

✓ ✗ I have explained why non-random allocation was the only suitable allocation method for Professor Shelby's experiment.²

✓ ✗ I have referred to the character's name (Professor Shelby) in my response, and to the scenario.

b. [Professor Shelby measured cortisol levels because they are an indicator of the stage of Selye's General Adaptation Syndrome that participants are in.¹][For example, during exhaustion, cortisol levels decrease after a sustained period of increased levels during resistance.²][This is relevant to Professor Shelby's study that investigates the time taken to reach exhaustion. If participants experienced a reduction in cortisol levels between measurements, Professor Shelby may infer that they had possibly reached exhaustion.³]

✓ ✗ I have explained that cortisol levels can indicate the stage of Selye's General Adaptation Syndrome that participants are in.¹

✓ ✗ I have explained how cortisol levels decrease between resistance and exhaustion.²

✓ ✗ I have explained how this may be useful for Professor Shelby because it may help them to determine when a participant reaches exhaustion.³

✓ ✗ I have referred to the character's name (Professor Shelby) in my response, and to the scenario.

Evaluate

23. [Selye's General Adaptation Syndrome has substantial explanatory power in terms of its ability to explain the stress response from a biological perspective. It focuses on the physiological reactions that occur in response to stressors.¹][However, Selye's General Adaptation Syndrome has limited explanatory power in terms of its ability to explain the stress response from a psychological perspective. It ignores the importance of psychological factors, including emotion and cognition, in the stress response.²][Therefore, while Selye's General Adaptation Syndrome is substantial in its power to explain the biological aspects of the stress response, the disregard for psychological aspects of the stress response limits its explanatory power.³]

✓ ✗ I have evaluated the explanatory power of Selye's General Adaptation Syndrome, with reference to strengths of the model.¹

✓ ✗ I have evaluated the explanatory power of Selye's General Adaptation Syndrome, with reference to limitations of the model.²

✓ ✗ I have made a concluding evaluation of the explanatory power of Selye's General Adaptation Syndrome.³

Questions from multiple lessons

24. D

3C Lazarus and Folkman's Transactional Model of Stress and Coping

Theory review

- B. False. *Remember, Lazarus and Folkman's model illustrates stress as a psychological process, whereas Selye's GAS illustrates stress as a biological response.*
- A. In Lazarus and Folkman's Transactional Model of Stress and Coping, each appraisal stage is **subjective** and therefore unique to each individual. *Psychological processes are always subjective and unique to each individual.*
- I; II; III; IV; V; VI. *Primary appraisal has two substages that categorise whether or not something is stressful, and then further classifies what the nature of the stressor is.*
- B. *Lazarus and Folkman use the language of problem-focused coping strategies, which directly address the stressor, and emotion-focused coping strategies, which indirectly deal with the stressor.*
- A. True. *The model presents a linear process that relies on people being aware of their mental processes, which is not always the case in real life.*

Assessment skills

Perfect your phrasing

6. A 7. A

Text analysis

8. B 9. C

Exam-style

Remember and understand

10. D 11. C 12. B

13. [One strength of Lazarus and Folkman's Transactional Model of Stress and Coping is that it highlights the subjective nature of the stress response for the individual, which can help to explain why different people respond to stressors differently.¹] [A limitation, however, is that the model presents primary and secondary appraisal as distinctly separate stages when, in reality, they may occur simultaneously.²]

I have identified one advantage of the Transactional Model.¹

I have identified one disadvantage of the Transactional Model.²

Other acceptable answers include:

- other strengths of the model, such as that it allows for consideration of cognitive processes within the stress response.
- other limitations of the model, such as that it does not include biological processes of stress.

14. [Primary appraisal in Lazarus and Folkman's Transactional model involves assessing the nature of the stressor and its impact on the individual.¹] [Initially, primary appraisal involves deeming the stressor as benign-positive, stressful, or irrelevant. For example, if an individual was worried about an upcoming exam, they would identify it as 'stressful'.²] [Secondly, primary appraisal involves deciding the kind of stress reaction that is caused, being either a challenge, threat, or having caused harm/loss. For example, if an individual sees their exam as an opportunity to do well, they would appraise the stressor as a 'challenge'.³]

I have outlined the purpose of primary appraisal as assessing the nature of a stressor.¹

I have explained the first component of primary appraisal with a relevant example.²

I have explained the second component of primary appraisal with a relevant example.³

I have used the language of the Transactional Model, referring to benign-positive, stressful, irrelevant, challenge, threat, and harm/loss.

Apply and analyse

15. B

16. A

17. A

18. a. [During primary appraisal, Yasmin would have deemed the situation 'stressful' and as a 'threat'.¹] [while Dean would have deemed the situation 'stressful' but viewed it as a 'challenge'.²] [Yasmin would have appraised the situation as a threat because of the potential pressure it would put on her while she was studying, while Dean would have appraised the situation as a challenge because he perceives it as a positive opportunity to find enjoyable work.³]

I have identified Yasmin's primary appraisal as a threat.¹

I have identified Dean's primary appraisal as a challenge.²

I have used information from the scenario to justify the evaluations Yasmin and Dean would have made.³

I have used the language of the Transactional Model, referring to benign-positive, stressful, irrelevant, challenge, threat, and harm/loss.

I have referred to the characters' names in my response (Dean and Yasmin), and to the scenario.

b. [Yasmin could employ wishful thinking by imagining that she will cope well living off less savings than before her trip.¹] [Yasmin could also distract herself from her lack of savings by hanging out at her friend's house when she is not studying.²]

I have identified one relevant emotion-focused coping strategy and explained how Yasmin could employ it.¹

I have identified a second relevant emotion-focused coping strategy and explained how Yasmin could employ it.²

I have referred to the character's name in my response (Yasmin), and to the scenario.

Other acceptable answers include:

- other relevant emotion-focused coping strategies, such as denial, so long as they were correctly applied to the scenario.

Questions from multiple lessons

19. a. [Sonya likely appraised the 'stressful' situation as harm/loss,¹] [as she regards her loss of friends and identity as damage that has already occurred.²]

I have identified the specific kind of primary appraisal Sonya experienced as stressful - harm/loss.¹

I have provided an example from the scenario to justify this.²

I have used the language of the Transactional Model, referring to stressful and harm/loss.

I have referred to the character's name in my response (Sonya), and to the scenario.

b. [Sonya is experiencing the alarm reaction stage of the General Adaptation Syndrome, specifically counter shock.¹] [This is because her sympathetic nervous system responses are engaged and at high levels, enabling her to have a high resistance to the stressor and the resources to be able to cope with it.²]

✓ ✗ I have identified alarm reaction (counter shock) as the stage Sonya is experiencing.¹

✓ ✗ I have described the evidence for Sonya being in counter shock.²

✓ ✗ I have used the language of the General Adaptation Syndrome, referring to alarm reaction and counter shock.

✓ ✗ I have referred to the character's name in my response (Sonya), and to the scenario.

20. [The General Adaptation Syndrome is a biological model tracking the physiological process of the stress response,¹] [whereas the Transactional Model is a psychological model in that it allows for the subjective mental interpretation of stress to be tracked.²]

✓ ✗ I have identified and explained the General Adaptation Syndrome as a biological model.¹

✓ ✗ I have identified and explained the Transactional Model as a psychological model.²

✓ ✗ I have used an appropriate distinguishing word, such as 'whereas'.

Other acceptable answers include:

- that the General Adaptation Syndrome focuses on biological features of the stress response, whereas the Transactional Model focuses on psychological/cognitive features.

3D The gut-brain axis

Theory review

1. A. True. *The gut refers to the long flexible tube from mouth to anus that is the passageway involved in digestion and consists of multiple components.*
2. I; III. *The gut-brain axis highlights the connection between the gut and the brain, which can also be described as the connection between the enteric nervous system and the central nervous system.*
3. B. False. *The gut-brain axis reflects a bidirectional relationship between the gut and the brain, meaning that communication can occur both ways.*
4. I; II; III. *Research has suggested that gut microbiota may be potentially linked to stress, mental illness, and cognitive decline but not eye colour.*
5. B. False. *It is important to understand that the gut-brain axis is an emerging area of research. Therefore, we cannot make definitive statements about the gut directly causing certain psychological processes or behaviours, including the experience of stress.*

Assessment skills

Perfect your phrasing

6. A 7. A 8. B

Text analysis

9. B 10. A 11. D

Exam style

Remember and understand

12. C 13. A 14. B 15. C

16. [The enteric nervous system refers to the network of nerves in the gut and is a subdivision of the autonomic nervous system.¹]

✓ ✗ I have outlined what the enteric nervous system is.¹

17. [The gut-brain axis refers to the bidirectional connection between the gut and the brain, through the enteric and central nervous systems.¹] [Emerging research suggests there is a potential link between the experience of mental illness, such as anxiety, and gut-related issues, such as irritable bowel syndrome.²]

✓ ✗ I have described the gut-brain axis.¹

✓ ✗ I have referred to emerging research to support my answer.²

18. [The gut-brain axis may influence cognition and memory.¹] [Emerging research suggests that an unhealthy gut microbiota is linked to poorer cognition and memory.²]

✓ ✗ I have identified one way in which the gut-brain axis may influence psychological processes and behaviour.¹

✓ ✗ I have justified my response by referring to findings from emerging research.²

Apply and analyse

19. A

20. [The gut-brain axis refers to the bidirectional connection between the gut and the brain through the enteric and central nervous systems.¹] [The bidirectional nature of the gut-brain axis means communication can occur both ways, therefore both Billy's conditions can impact each other.²] [In this way, Billy's irritable bowel syndrome suggests his gut is unhealthy which may influence the neural messages his enteric nervous system sends to the brain, potentially contributing to the existence of his anxiety disorder.³] [Furthermore, Billy's anxiety disorder may influence the neural messages his central nervous system sends to the gut, potentially contributing to the presence of his irritable bowel syndrome.⁴]

✓ ✗ I have described the gut-brain axis.¹

✓ ✗ I have described the bidirectional nature of the gut-brain axis and how this influences both of Billy's conditions.²

✓ ✗ I have described how Billy's irritable bowel syndrome relates to the gut-brain axis, with reference to the enteric nervous system.³

✓ ✗ I have described how Billy's anxiety disorder relates to the gut-brain axis, with reference to the central nervous system.⁴

✓ ✗ I have referred to the character's name (Billy) in my response, and to the scenario.

Evaluate

21. a. [It is likely that the results will show that the group with no diagnosis or history of mental illness had a healthy and diverse gut microbiota.¹] [In comparison, it is likely that the results will show that the group with major depressive disorder had an unhealthy and less diverse gut microbiota.²] [This is because the gut-brain axis suggests there is a potential link between the presence of mental illnesses, such as major depressive disorder, and the health of gut microbiota because there is bidirectional communication between the brain and the gut.³]

I have suggested a potential result for this study, with reference to the control group.¹

I have suggested a potential result for this study, with reference to the experimental group.²

I have appropriately referred to and explained the gut-brain axis in my answer.³

- b. [A potential extraneous variable in this study is individual participant differences, as the participants were not categorised by sex.¹]

I have identified one potential extraneous variable in this study.¹

Other acceptable answers include:

- other individual participant differences, such as age or other medical disorders.

Questions from multiple lessons

22. [An external stressor is a stimulus originating from outside of a person's body that prompts the stress response.¹] [An example of an external stressor is having an upcoming exam.²] [Having an upcoming exam can increase stress levels, which, due to the gut-brain axis, can increase the likelihood of experiencing gut-related issues, such as stomach pains, because of the neural messages sent from the central nervous system to the enteric nervous system.³]

I have described external stressors.¹

I have used an example of an external stressor.²

I have described how this external stressor can influence the gut.³

Other acceptable answers include:

- family problems
- relationship break-up
- employment
- other external stressors.

3E Coping with stress

Theory review

1. A. True. *When speaking about general coping strategies, there are those that directly address the stressor (approach) and those that indirectly reduce stress by managing emotions (avoidance).*
2. B. When you consider the unique demands of the stressor and the situation in which it occurs, you are demonstrating **context-specific effectiveness**. *Context-specific effectiveness is when you match your coping strategy to the specific stressor and situation.*
3. A. Adapting coping strategies when the ones you are using are not working is known as **coping flexibility**. *Coping flexibility refers to the ability to change your coping strategy when needed.*
4. I; II; V. *Sleeping and distracting yourself may temporarily reduce stress, but they are considered 'avoidance' strategies as they do not directly tackle the source of stress.*

Assessment skills

Perfect your phrasing

5. B 6. A

Text analysis

7. D 8. C 9. D

Exam-style

Remember and understand

10. B 11. A
12. [Coping flexibility refers to the ability to change coping strategies to best suit the changing demands of a stressor.¹] [This helps to reduce stress, as the strategies used more accurately target the stressor.²] [For example, if someone has the stressor of an upcoming football game and begins to cope by exercising, but then finds out a good player on their team won't be able to play the game, they might show coping flexibility by scheduling more training sessions with their teammates.³]

I have defined coping flexibility as the ability to change one's coping strategies.¹

I have explained how using coping flexibility helps deal with a stressor.²

I have provided a relevant example demonstrating how coping flexibility can be used.³

Apply and analyse

13. [Naima could explain her situation to her teachers and negotiate extensions for her work, which would be an approach strategy.¹] [Alternatively, Naima could try to relax by listening to her favourite music when she gets home from school, which would be an avoidance strategy.²]

I have identified an appropriate approach strategy.¹

I have identified an appropriate avoidance strategy.²

I have referred to the character's name (Naima) in my response, and to the scenario.

14. A

15. C

16. a. [Genevieve was using avoidance coping strategies¹][because dropping her daughter off at kindergarten meant that she did not have to deal directly with the stressor of looking after her.²]

I have correctly identified avoidance as the kind of coping strategy used.¹

I have justified why dropping her daughter off was an avoidance coping strategy.²

I have used the language of coping by referring to avoidance coping strategies.

I have referred to the character's name (Genevieve) in my response, and to the scenario.

b. [Genevieve was using an approach coping strategy¹][because booking a doctor's appointment directly confronts the source of the stressor, targeting her daughter's sickness.²]

I have correctly identified approach as the kind of coping strategy used.¹

I have justified why booking her daughter an appointment was an approach coping strategy.²

I have used the language of coping, by referring to approach coping strategies.

I have referred to the character's name in my response (Genevieve), and to the scenario.

c. [Coping flexibility refers to the ability to change coping strategies depending on the changing elements of the stressor.¹][Genevieve employed this by changing her coping strategy from avoidant coping (dropping her daughter off at kindergarten), to approach coping when the stressor worsened (her daughter got more sick) by booking an appointment.²][This shows flexibility because as the demands of the stressor increased, the coping strategy became more confrontational.³]

I have explained the concept of coping flexibility.¹

I have explained how Genevieve changed her coping strategies within the scenario.²

I have explained how this example of coping flexibility helped Genevieve to effectively deal with her stressor.³

I have referred to the character's name in my response (Genevieve), and to the scenario.

Questions from multiple lessons

17. C

18. [The gut-brain axis refers to the bidirectional connection between the gut and the brain through the enteric and central nervous systems. Research on the gut-brain axis has suggested there is a link between stress levels and gut-related conditions.¹][When Archie gets stressed his central nervous system may send messages to the enteric nervous system, his gut, which may explain his sore stomach.²]

I have explained what the gut-brain axis is.¹

I have explained that, due to the gut-brain axis, stress can cause gut-related conditions.²

I have referred to the character's name (Archie) in my response, and to the scenario.

19. a. [Janet is currently experiencing the resistance stage of the General Adaptation Syndrome.¹][This is clear in her ability to work non-stop which would require sustained mobilisation of the body, and the fact that she is beginning to feel sick.²]

I have correctly identified resistance as the stage of the General Adaptation Syndrome Janet is in.¹

I have provided examples of Janet's scenario that support this stage.²

I have referred to the character's name (Janet) in my response, and to the scenario.

b. [Context-specific effectiveness is when the coping mechanism used is appropriate for the demands of the stressor.¹][Because Janet has so many stressors with work and packing up her house, exercise demonstrates context-specific effectiveness.²][As she is sick from non-stop work, and is feeling overwhelmed, exercise is a good way to relieve some stress and distract her from the stressors that she cannot directly control.³]

I have explained what context-specific effectiveness requires.¹

I have said whether or not physical exercise fulfils the requirements of context-specific effectiveness.²

I have justified why her running is or isn't an appropriate coping mechanism.³

I have referred to the character's name (Janet) in my response, and to the scenario.

Other acceptable answers include:

- running is not an example of context-specific effectiveness, so long as it was justified. For example, running means that Janet won't have time to deal with her stressors, or because she is getting sick, a better strategy could be to rest so that she does not enter exhaustion.

Chapter 3 review

Multiple choice

1. A 2. A 3. B 4. C
5. D 6. A

Short answer

7. a. [In primary appraisal, Antoni appraised the flooding as stressful; harm/loss,¹] [as he thought about all the damage that had already occurred and how it meant he could never have a repaired house.²]

I have correctly identified Antoni's primary appraisal as stressful; harm/loss.¹

I have provided evidence from the scenario to support this.²

I have referred to the character's name (Antoni) in my response, and to the scenario.

Other acceptable answers include:

- You may have said Antoni appraised the stressor as a threat to his ability to live in a house and have a good life.

- b. [Antoni is likely in resistance¹] [seen in his display of resistance characteristics such as his susceptibility to colds due to the prolonged release of cortisol.²]

I have correctly identified that Antoni is experiencing resistance.¹

I have provided evidence from the scenario that supports the resistance stage.²

I have referred to the character's name in my response (Antoni), and to the scenario.

Other acceptable answers include:

- other justifications for Antoni experiencing resistance including the ability to continue to fight the stressor at an above normal level of functioning and/or his focusing of energy only on the stressor of his house.

- c. [Coping flexibility refers to the ability to adjust coping strategies in the face of the unique or changing demands of a stressor.¹] [Antoni is demonstrating coping flexibility²] [seen in his change in approach to focus on repairing one room as his money ran out.³]

I have described the concept of coping flexibility.¹

I have correctly identified that Antoni is demonstrating coping flexibility.²

I have described how Antoni demonstrated coping flexibility.³

I referred to the character's name in my response (Antoni), and to the scenario.

8. [Acute stress refers to a form of stress characterised by intense psychological and physiological symptoms that are brief in duration, such as the fight-flight-freeze response.¹] [For example, when seeing a spider your heart may start to race, but when the spider crawls away you may calm down.²] [Contrastingly, chronic stress is a form of stress that endures for several months or longer and involves the sustained release of cortisol.³] [For example, over a school year you may have many tests and assessments, leading to chronic stress.⁴]

I have defined acute stress and labelled the relevant response as fight-flight-freeze.¹

I have provided an example of an acute stress response.²

I have defined chronic stress and explained that the response involves cortisol.³

I have provided an example of a chronic stress response.⁴

I have used an appropriate distinguishing phrase, such as 'contrastingly'.

9. [The gut-brain axis refers to the bidirectional connection between the gut and the brain, through the enteric and central nervous systems.¹] [It teaches us that the experience of stress is controlled by more than just the brain, but is also influenced by our gut, explaining why Duyen had a sore stomach when she was stressed about exams.²]

I have described the gut-brain axis.¹

I have explained that Duyen's experience of stress is shaped by both the gut and the brain.²

I have referred to the character's name (Duyen) and the scenario in my response.

10. [Ngoza is experiencing ongoing stress due to her low levels of coping flexibility.¹] [Going for a run while listening to music has become an ineffective coping strategy and no longer reduces Ngoza's stress.²] [However, she has failed to adapt effectively by implementing a new strategy, so she continues to experience stress.³]

I have labelled low coping flexibility as the cause of stress.¹

I have explained that going for a run is no longer an effective coping strategy.²

I have explained that her stress results from her failing to change coping strategies.³

I have referred to the character's name (Ngoza) and the scenario in my response.

11. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

In relation to psychological processes of stress, discussion of the following would be awarded:

- Experiences of stress can differ from person to person, and that 'stressful experiences' are subjective.

- Causes of stress, which would most likely be both internal and external for students while at university.
- The difference between eustress and distress, applied to common university experiences, such as studying for exams.
- Lazarus and Folkman's Transactional Model of Stress and Coping, specifically that different appraisals and access to coping strategies would shape how individuals experience stress.

In relation to physiological processes of stress, discussion of the following would be awarded:

- An explanation of the gut-brain axis and how this may result in stomach concerns during times of stress.
- The role of cortisol in chronic stress, and how a university student may experience the stages of Selye's General Adaptation Syndrome across a semester of university studies. Specifically, how more instances of stress may result in more illness during the exhaustion stage.

In relation to limitations of the research, discussion of the following would be awarded:

- The inherent limitations of self-reporting as a research methodology. Specifically, that students may be motivated to report more or less stressful experiences than is truthful. This could be addressed through a controlled experiment that simulates a stressful situation.
- Individual differences between participants within the study, such as:
 - Dr. Peppe could have controlled for factors like gender or age, which may impact health independently of stress.
 - No serious medical history implies physical health, but diagnosed mental health concerns or other medication may play a role.
- These can be controlled through different experimental structures, such as a matched participants design.

Unit 3 AOS 1 review

SAC assessment 1

1. a. [It is hypothesised that individuals who listen to music after the stress task¹][will have lower²][blood pressure than individuals who do not listen to music after the stress task.³]

I have identified the independent variable.¹

I have stated a direction (predicted effect of the IV on the DV) for my hypothesis.²

I have identified the dependent variable.³

- b. [The type of controlled experiment design used in this study is a between-subjects design.¹][A between-subjects design is an experimental design in which individuals are divided into different groups and complete only one experimental condition.²]

I have identified the type of research design as a between-subjects design.¹

I have described this research design.²

2. a. [Quantitative data has been used in this study.¹]

I have identified quantitative data as the type of data collected in this study.¹

- b. [Blood pressure is an appropriate measure because it is shown that an increase in blood pressure occurs when an individual is stressed and therefore is likely to be an accurate biological measure of stress.¹]

I have outlined why blood pressure is appropriate to use in this study.¹

- c. [Changes to blood pressure are an unconscious response.¹]

I have stated that changes to blood pressure are an unconscious response.¹

3. a. [The autonomic nervous system is being measured in this study.¹]

I have stated that the autonomic nervous system is being measured in this study.¹

Other acceptable answers include:

- You could have identified the parasympathetic and sympathetic nervous systems, as these are the subdivisions of the autonomic nervous system. However, only identifying one of these systems would be incorrect as the researchers were interested in the activation of both.
- b. [It is likely that the sympathetic nervous system of the autonomic nervous system was dominant in activity during the stress task,¹][and the parasympathetic nervous system of the autonomic nervous system was less active.²]

I have described the likely activity of the autonomic nervous system during the stress task, with reference to the sympathetic nervous system.¹

I have described the likely activity of the autonomic nervous system during the stress task, with reference to the parasympathetic nervous system.²

4. [The results suggest that listening to classical music after stress exposure resulted in a greater reduction in blood pressure¹][compared to both the control group (no music) and experimental group who listened to jazz music.²][This may mean that people should listen to classical music after experiencing stress to help recover and manage their stress levels better.³]

I have described the results of the experimental group listening to classical music.¹

I have compared these results to the results of the control group (no music) and other experimental group (jazz music).²

I have suggested what this may mean for managing stress levels through listening to music.³

5. a. [The stress task would be an external stressor.¹][This is because external stressors are stimuli from outside of a person's body that prompt the stress response and the stress task is something that comes from the participant's interaction with the world around them.²]
- I have identified that the stress task would be considered an external stressor.¹
-
- I have justified my response.²
-
- b. [Acute stress is a form of stress characterised by intense psychological and physiological symptoms that are brief in duration, whereas¹][chronic stress is a form of stress that endures for several months or longer.²][Participants are likely to be experiencing acute stress.³]
- I have described acute stress.¹
-
- I have described chronic stress.²
-
- I have identified that the participants are likely to be experiencing acute stress.³
-
- I have used comparison words, such as 'whereas'.
-
- c. [Heart rate is another biological measure that could be used to measure levels of stress in this study.¹][This is because heart rate is a physiological response that increases in response to stress.²]
- I have identified another biological measure that could be used to measure levels of stress in this study.¹
-
- I have explained and justified this biological measure.²
-
- d. [Context-specific effectiveness refers to when the coping strategy or mechanism used is appropriate for the unique demands of the stressor.¹][Therefore although this is an effective coping strategy for this stress task, it may not be effective for other situations in which listening to classical music is not accessible or feasible solution, such as during a long exam.²]
- I have explained what is meant by context-specific effectiveness.¹
-
- I have outlined that this strategy would not be effective in all stressful situations.²
-
6. [The flight-or-fight-or-freeze response is an involuntary and automatic response to a threat that takes the form of either escaping it, confronting it, or freezing in the face of it.¹][Participant 1 is likely to be experiencing the freeze response because they are unable to move or complete the task.²]
- I have described the flight-or-fight-or-freeze response.¹
-
- I have described that participant 1 is likely to be experiencing the freeze response.²
-
7. a. [Selye's General Adaptation Syndrome (GAS) is a biological model involving three stages of physiological reactions that a person experiences in response to a persistent stressor.¹]
- I have described Selye's General Adaptation Syndrome (GAS).¹
-
- b. [The participants are likely to be in the shock substage of the alarm reaction stage of the GAS model.¹][This is because they have just been exposed to the stressor and they are likely to be experiencing a decrease in bodily arousal as they are being confronted with the stressor for the first time.²]
- I have outlined that the participants are likely to be in the shock substage of the alarm reaction stage of the GAS.¹
-
- I have justified my response.²
-
8. [Levels of adrenaline for all participants would increase.¹][This is because adrenaline is a stress hormone released in response to the acute stress experienced by participants during the stress task that occurred for a brief duration.²]
- I have explained what would happen to the levels of adrenaline for all groups of participants.¹
-
- I have justified my response.²
-
9. [In participant 4's brain, when they stopped practising their mathematics skills once they finished school, synaptic connections between neurons involved in mathematics would no longer be repeatedly coactivated.¹][Over time, due to long-term depression, this resulted in the neural pathway representing mathematical ability becoming weaker and weaker, making it more and more difficult for participant 4 to do maths, including mental arithmetic.²]
- I have explained that synaptic connections would no longer be repeatedly coactivated when participant 4 stops practising mathematics skills.¹
-
- I have explained that this would weaken participant 4's neural pathway representing mathematical ability, due to long-term depression.²
-
10. [Decreased perspiration is a physiological sign of reduced stress, similar to reduced blood pressure.¹][Individuals listening to classical music are likely to experience decreased perspiration compared to an individual who does not listen to classical music, after stress exposure.²][This is because the results suggest that individuals who listen to classical music have more significantly reduced blood pressure and in this way, it may be likely that perspiration would also decrease as stress decreases.³]
- I have outlined that decreased perspiration is a physiological sign of reduced stress.¹
-
- I have suggested that individuals listening to classical music are likely to experience decreased perspiration compared to an individual who does not listen to classical music, after stress exposure.²
-
- I have referred to the results from the experiment.³
-

11. [Lazarus and Folkman's Transactional Model of Stress and Coping is a model that helps to track and interpret an individual's subjective psychological stress response.¹] [According to this study, individuals who listen to music are unlikely to appraise a stressor differently from individuals who don't listen to music.²] [This is because the results from this experiment are based on biological measures whereas Lazarus and Folkman's Transactional Model of Stress and Coping is a psychological measure, and therefore the results cannot be generalised to this model.³]

I have described Lazarus and Folkman's Transactional Model of Stress and Coping.¹

I have suggested that individuals who listen to music post-stress are unlikely to appraise a stressor differently to individuals who do not listen to music post-stress.²

I have justified my response.³

12. [A piece of information that the results provide evidence for is that listening to classical music after completing something stressful may help to reduce blood pressure more effectively than not listening to music.¹] [One way this can be applied to the real world is by introducing a program that encourages high-school students to listen to classical music after completing an assessment to help them reduce their physiological arousal.²]

I have identified one piece of information that the results provide evidence for about stress and listening to music.¹

I have described how this can be applied to the real world.²

Unit 3 AOS 1 review

SAC assessment 2

1. a. [The gut-brain axis is the bidirectional connection between the gut and the brain through the enteric and central nervous systems.¹] [These nervous systems are connected by the vagus nerve, enabling the gut and the brain to communicate.²]

I have described the gut-brain axis.¹

I have described the gut-brain axis in further detail by providing another point of information.²

b. [Faecal transplants involve transferring faeces from a healthy donor to a patient to increase the health of the gut microbiome, which can potentially improve mental health for some patients.¹] [This provides evidence that the gut and brain are connected through the gut-brain axis, given that a treatment that impacts the gut also has an effect on the brain.²]

I have explained what faecal transplants are.¹

I have explained how faecal transplants provide evidence for the gut-brain axis.²

c. [Germ-free animal studies are an example of emerging research that provides evidence for the gut-brain axis.¹] [These studies compare psychological processes and behaviour of healthy animals and germ-free animals, who have had microorganisms removed from their gut microbiota.²] [These studies observed significant changes in anxiety behavioural responses in germ-free mice, indicating that changing the gut microbiome of an animal may also change its mental health.³]

I have identified an example of emerging research, other than faecal transplants, that provides evidence for the gut-brain axis.¹

I have described this example of emerging research.²

I have described how this example of emerging research provides evidence for the gut-brain axis.³

Other acceptable answers include:

- microbiota composition in humans
- gut-related diseases
- other examples of emerging research that provide evidence for the gut-brain axis.

2. a. [Serotonin is a neuromodulator.¹] [Neuromodulators are chemical molecules that, when released from the presynaptic neuron, have an effect on multiple postsynaptic neurons.²]

I have identified that serotonin is a neuromodulator.¹

I have described what neuromodulators are.²

b. [Serotonin has a role in mood regulation, enabling a person to experience positive and stable moods.¹] [People with depression have imbalanced serotonin levels in their brains, which explains why they experience prolonged negative moods. Therefore, antidepressant medications target serotonin to balance serotonin levels and reduce depressive symptoms.²]

I have explained the role of serotonin in functioning.¹

I have explained why antidepressant medications target serotonin.²

c. i. [A neural synapse is the region that includes the axon terminals of the presynaptic neuron, the synaptic gap, and the dendrites of the postsynaptic neuron.¹]

I have outlined what a neural synapse is.¹

ii. [Serotonin is released from the axon terminals of the presynaptic neuron into the synaptic gap.¹] [Serotonin binds to corresponding receptor sites on the dendrites of postsynaptic neurons that match its specific molecular structure.²] [Once bound, serotonin can successfully have its inhibitory effect on postsynaptic neurons, making them less likely to fire action potentials.³]

✓ ✗ I have described how serotonin is released into the synaptic gap.¹

✓ ✗ I have described how serotonin binds to corresponding receptor sites.²

✓ ✗ I have described how serotonin has its inhibitory effect on postsynaptic neurons.³

iii. [No, serotonin was not being successfully transmitted across neural synapses in John and Rachel's brains before they started taking antidepressant medications.¹]

✓ ✗ I have identified that serotonin was not being successfully transmitted across neural synapses in John and Rachel's brains before they started taking antidepressant medications.¹

3. a. [GABA is another neurochemical, specifically a neurotransmitter, that regulates anxiety.¹][The inhibitory effects of GABA regulate postsynaptic activation in neural pathways, preventing the uncontrolled firing of action potentials and reducing anxiety.²]

✓ ✗ I have identified GABA as another neurochemical that regulates anxiety.¹

✓ ✗ I have explained how GABA regulates anxiety.²

b. i. [The activation of sweat glands, increasing perspiration,¹ and the secretion of stress hormones, including adrenaline, from adrenal glands are physiological responses that may occur during a stress response.²]

✓ ✗ I have identified a physiological response that may occur during a stress response.¹

✓ ✗ I have identified another physiological response that may occur during a stress response.²

Other acceptable answers include:

- increased heart rate
- increased breathing rate
- dilated pupils
- other physiological responses that may occur during a stress response.

ii. [Sympathetic nervous system.¹]

✓ ✗ I have identified the sympathetic nervous system as the division of the nervous system responsible for the physiological responses identified in **part b.i.**¹

Note: The autonomic nervous system is not an acceptable answer for this question. This is because the physiological responses that may occur during a stress response only involve the sympathetic nervous system, not the parasympathetic nervous system. Given that the autonomic nervous system involves both the sympathetic and parasympathetic nervous systems, it is not a specific enough response for this question.

4. [Rachel's brain (central nervous system) would formulate, coordinate, and initiate a conscious motor response to pick up an antidepressant tablet and put it in her mouth.¹][This motor neural message would be transmitted via efferent tracts in the spinal cord (central nervous system) and motor neural pathways in the somatic nervous system (peripheral nervous system) to skeletal muscles in Rachel's arm and hand.²][These skeletal muscles would then carry out the motor movement of picking up the antidepressant tablet and putting it in Rachel's mouth.³]

✓ ✗ I have described how the brain formulates, coordinates, and initiates a motor response.¹

✓ ✗ I have described how this motor neural message is sent to skeletal muscles.²

✓ ✗ I have described how skeletal muscles carry out the motor movement.³

✓ ✗ I have referred to the character's name (Rachel) in my response, and to the scenario.

5. a. [John's experience of a mental health problem before being prescribed antidepressants is an example of chronic stress.¹][This is because chronic stress refers to stress that endures for several months or longer, and John says that he had been 'struggling for years' with his mental health problem at the time that he was prescribed antidepressants.²]

✓ ✗ I have identified that John's experience of a mental health problem before being prescribed antidepressants is an example of chronic stress.¹

✓ ✗ I have justified my response, with reference to John 'struggling for years'.²

✓ ✗ I have referred to the character's name (John) in my response, and to the scenario.

b. [The coping strategy of Rachel taking antidepressants to treat her depression is an example of an approach strategy.¹][This is because approach strategies directly confront the source of the stress, consequently reducing or eliminating it. Rachel is directly addressing the serotonin imbalance in her brain (source of the mental health problem) by taking antidepressants, thus reducing her depressive symptoms.²]

✓ ✗ I have identified that Rachel's coping strategy is an example of an approach strategy.¹

✓ ✗ I have justified my response, with reference to what is meant by approach strategy.²

✓ ✗ I have referred to the character's name (Rachel) in my response, and to the scenario.

c. [The likely secondary appraisal that Jane would have after receiving faecal transplants is that she has adequate resources to cope with the stressor of living with a mental health problem.¹][This is because faecal transplants have enabled Jane to experience enormous improvements in her bipolar symptoms and become a 'fully functional adult'. Therefore, Jane would likely consider faecal transplants to be an adequate coping resource that will continue to reduce her stress of living with a mental health disorder.²]

✓ ✗ I have identified the likely secondary appraisal as having adequate coping resources.¹

✓ ✗ I have justified my response, with reference to the improvements in Jane's bipolar symptoms due to faecal transplants.²

✓ ✗ I have referred to the character's name (Jane) in my response, and to the scenario.

6. a. [The independent variable of this investigation is the treatment method of either faecal transplants, antidepressants, or no treatment.¹][The dependent variable of this investigation is the change in depressive symptoms.²]

✓ ✗ I have identified the independent variable.¹

✓ ✗ I have identified the dependent variable.²

b. i. [Within-subjects is a controlled experiment design in which participants complete every experimental condition, in this case, participants experience faecal transplants, antidepressants, and no treatment for their depressive symptoms.¹]

✓ ✗ I have outlined what is meant by a within-subjects controlled experiment design.¹

ii. [A possible limitation of this controlled experiment design is order effects, which is the tendency for the order in which participants complete experimental conditions to affect their behaviour.¹][This could be overcome by counterbalancing, which involves splitting the participants and having them complete the conditions in different orders.²]

✓ ✗ I have outlined a possible limitation of this controlled experiment design.¹

✓ ✗ I have explained how this limitation could be overcome.²

c. [Informed consent is an ethical consideration that must be upheld in this investigation.¹][The researcher must ensure participants understand the both nature and purpose of the investigation, including potential physical and psychological risks, before voluntarily agreeing to participate.²]

✓ ✗ I have identified an ethical consideration that must be upheld in this investigation.¹

✓ ✗ I have outlined how it may be upheld in this investigation.²

Other acceptable answers include:

- confidentiality
- withdrawal rights
- debriefing
- other ethical considerations.

d. [The dependent variable of depressive symptoms could be measured through a survey in which participants rated their symptoms on a scale from 1 (low depressive symptoms) to 5 (high depressive symptoms).¹]

✓ ✗ I have suggested how the dependent variable could be measured.¹

e. [The likely results of the research investigation is that participants would have decreased depressive symptoms¹][when they were receiving treatment (either faecal transplants or antidepressants) compared to when they were not receiving treatment.²]

✓ ✗ I have described the likely results of the research investigation by stating that depressive symptoms would decrease.¹

✓ ✗ I have described the likely results of the research investigation by stating that this decrease in depressive symptoms would occur when participants are receiving treatment compared to no treatment.²

Note: It is important that, when describing the likely results of the investigation, you use the language of a within-subjects controlled experiment design. In other words, you would not be awarded marks if you stated 'participants in the treatment conditions had decreased depressive symptoms compared to participants in the control condition', because this language suggests that a between-subjects experiment design was used.

4A Classical conditioning

Theory review

1. A. *Classical conditioning is a behaviourist approach to learning because it occurs due to an individual's interaction with stimuli from their external environment.*
2. B. *The three phases of classical conditioning are before conditioning, **during conditioning**, and after conditioning. The order of the classical conditioning stages is: before conditioning, during conditioning, and after conditioning.*
3. II; III; IV. *Classical conditioning is an involuntary learning process whereby an association is formed between a neutral stimulus and an unconditioned stimulus to produce a conditioned response.*
4. B. *False. The neutral stimulus produces no response during the before conditioning phase of classical conditioning.*
5. B. *The neutral stimulus becomes the conditioned stimulus in the **after conditioning** phase of classical conditioning. The neutral stimulus is repeatedly paired with the unconditioned stimulus, producing an unconditioned response in the during conditioning phase. Then, in the after conditioning phase, the neutral stimulus has become a conditioned stimulus, producing a conditioned response.*
6. B. *The unconditioned stimulus and neutral stimulus are repeatedly paired in the during conditioning phase of classical conditioning.*

Assessment skills

Perfect your phrasing

7. A 8. B

Text analysis

9. B 10. D

Exam style

Remember and understand

11. C 12. B

13. [The neutral stimulus is the stimulus that produces no significant response during the before conditioning phase,¹] [whereas the unconditioned stimulus is the stimulus that produces an unconscious response.²]

I have described the neutral stimulus during classical conditioning.¹

I have described the unconditioned stimulus during classical conditioning.²

I have used comparison words, such as 'whereas.'

14. [Before conditioning is the first phase of classical conditioning, whereby the neutral stimulus produces no significant response and the unconditioned stimulus produces the unconditioned response.¹]
[During conditioning is the second phase of classical conditioning, whereby the neutral stimulus is repeatedly paired with the unconditioned stimulus, producing the unconditioned response.²]
[After conditioning is the third and final stage of classical conditioning, whereby the neutral stimulus has become the conditioned stimulus, producing the conditioned response.³]

I have identified and described the before conditioning phase of classical conditioning.¹

I have identified and described the during conditioning phase of classical conditioning.²

I have identified and described the after conditioning phase of classical conditioning.³

Apply and analyse

15. B 16. C 17. A

18. [During the before conditioning phase of classical conditioning, the unconditioned stimulus for Dudley is the anticipation of being taken on a morning walk, producing the unconditioned response of excited tail wagging, while the neutral stimulus is taking the jacket off a coat hanger by the front door, producing no significant response.¹]
[During the during conditioning phase of classical conditioning, the neutral stimulus of taking the jacket off a coat hanger by the front door is repeatedly paired with the anticipation of being taken for a walk, producing the unconditioned response for Dudley of excited tail wagging.²]
[During the after conditioning phase of classical conditioning, taking the jacket off a coat hanger by the front door becomes the conditioned stimulus, which produces Dudley's conditioned response of excited tail wagging in response to taking the jacket off a coat hanger.³]

I have described the before conditioning phase of Dudley learning to get excited and wag his tail.¹

I have described the during conditioning phase of Dudley learning to get excited and wag his tail.²

I have described the after conditioning phase of Dudley learning to get excited and wag his tail.³

I have referred to the character's name (Dudley) in my response, and to the scenario.

Questions from multiple lessons

19. a. [The sympathetic nervous system.¹]

I have identified that Samia's sympathetic nervous system is dominant when she starts to sweat at the cookware store.¹

- b. [During the before conditioning phase of classical conditioning, Samia putting on an apron is a neutral stimulus that produces no significant response, while the heat from the kitchen is an unconditioned stimulus that produces the unconditioned response of sweating.¹] [During the during conditioning phase of classical conditioning, the neutral stimulus of putting on the apron is repeatedly paired with the unconditioned stimulus of the kitchen's heat, producing the unconditioned response of sweating.²] [During the after conditioning phase of classical conditioning, Samia putting on an apron becomes a conditioned stimulus that produces the conditioned response of sweating in response to putting on an apron.³]

I have described the before conditioning phase of Samia's classically conditioned response.¹

I have described the during conditioning phase of Samia's classically conditioned response.²

I have described the after conditioning phase of Samia's classically conditioned response.³

I have referred to the character's name (Samia) in my response, and to the scenario.

4B Operant conditioning

Theory review

1. C. *Operant conditioning is a behaviourist approach to learning because it suggests that learning is an observable process that occurs due to an individual's interaction with stimuli in their environment.*
2. A. The three phases of operant conditioning are **antecedent**, behaviour, and consequence. *Before conditioning is a phase of classical conditioning instead.*
3. B. False. *The nature of the learnt response during operant conditioning is voluntary, whereas the conditioned response during classical conditioning is involuntary.*
4. I; IV. *Reinforcement in general increases the likelihood that a behaviour will occur again, while negative reinforcement in particular involves the removal of an undesirable stimulus.*
5. B. During operant conditioning, **punishment** is used to decrease the likelihood of a behaviour occurring again in the future. *Punishment is a form of consequence during operant conditioning that decreases the likelihood of the behaviour occurring again in the future.*
6. B. False. *'Positive' and 'negative' take on a different meaning when used in the context of operant conditioning, so negative reinforcement refers to taking away something undesirable in order to reinforce a particular behaviour.*

Assessment skills

Perfect your phrasing

7. A 8. A

Text analysis

9. A 10. B

Exam-style

Remember and understand

11. D 12. A

13. [Positive punishment refers to the presentation of an undesirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring.¹] [Whereas, negative punishment refers to the removal of an desirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring.²]

I have described positive punishment.¹

I have described negative punishment.²

I have used comparison words, such as 'whereas.'

14. [Operant conditioning is a three-phase learning process that involves an antecedent, behaviour, and consequence, whereby the consequence of a behaviour determines the likelihood that it will occur again in the future.¹] [The antecedent refers to the circumstances that prompt a particular behaviour.²] [The behaviour then refers to the actions that follow the antecedent.³] [Finally, the consequence refers to the outcome of the behaviour, which determines the likelihood that it will occur again.⁴]

I have described operant conditioning as a three-phase process of learning.¹

I have described the antecedent phase of operant conditioning.²

I have described the behaviour phase of operant conditioning.³

I have described the consequence phase of operant conditioning.⁴

Apply and analyse

15. D 16. C 17. A 18. B

19. [The antecedent in this scenario is Bethany wanting to improve her grades after receiving a disappointing school report.¹] [The behaviour is that Bethany studies for at least one hour each night in order to improve her grades.²] [The consequence is that Bethany no longer has to take the bins out each week, which acts as negative reinforcement and increases the likelihood that Bethany will continue to study for at least one hour during the week.³]

I have identified the antecedent in this scenario.¹

I have identified the behaviour in this scenario.²

I have identified the consequence in this scenario, which is negative reinforcement.³

I have referred to the character's name (Bethany) in my response, and to the scenario.

Questions from multiple lessons

20. [Classical conditioning involves learning an involuntary response, which is coordinated by the autonomic nervous system,¹] [whereas operant conditioning involves learning a voluntary response, which is coordinated by the somatic nervous system.²]

I have identified that the involuntary response of classical conditioning is coordinated by the autonomic nervous system.¹

I have identified that the voluntary response of operant conditioning is coordinated by the somatic nervous system.²

I have used comparison words, such as 'whereas.'

4C Observational learning

Theory review

1. I; III. *Social-cognitive approaches to learning highlight the importance of the social context in which learning takes place and the cognitive processes associated with learning, such as attention and motivation.*
2. D. *Observational learning is an example of a social-cognitive approach to learning, while classical conditioning and operant conditioning are examples of behaviourist approaches to learning.*
3. B. In observational learning, the **learner** observes a **model** perform a behaviour. *In observational learning, the model is the person who performs the behaviour while the learner is the person who watches the behaviour.*
4. B. False. *There are five stages of observational learning a person must progress through in order to successfully learn a behaviour, not three.*
5. I; II; V; VII; VIII. *Attention, retention, reproduction, motivation, and reinforcement are the five stages of observational learning. To help you remember the order of these stages, you can use the acrostic 'All Roads Require Maintenance Regularly.'*

Assessment skills

Compare and evaluate

6. C 7. B 8. C 9. A
10. D

Exam-style

Remember and understand

11. B 12. B

13. [Observational learning is a process of learning that involves observing the behaviour of a model, and the consequence of those behaviours, in order to guide future behaviours.¹]

I have outlined what is meant by observational learning.¹

14. [Attention is the first stage of observational learning in which individuals actively focus on the model's behaviour and the consequences of the behaviour.¹] [For example, actively observing that a friend's studying technique gets her good grades.²]

I have described the stage of attention in observational learning.¹

I have provided an example of the stage of attention in observational learning.²

Apply and analyse

15. A 16. B 17. A 18. D

19. a. [The children are not able to provide their own informed consent.¹] [This is because they are under the age of eighteen and therefore their parents or legal guardians need to provide informed consent on their behalf.²]

I have stated that the children were not able to provide their own informed consent.¹

I have justified why they were not able to provide their own informed consent, with reference to their age.²

b. [The level of aggression may differ between participants and therefore may be considered as the extraneous variable of participant-related variables.¹] [Therefore, by comparing the pre-test results to the post-test results, Dr Osman can assess whether the participants' aggression levels (dependent variable) changed in response to the independent variable (condition allocation) or whether they are a result of the extraneous variable.²]

I have explained that the level of aggression may be considered as an extraneous variable of participant-related variables.¹

I have explained that comparing the pre-test results to the post-test result enables Dr Osman to determine whether the extraneous variables impacted the results.²

I have referred to the character's name (Dr Osman) in my response, and to the scenario.

c. [Attention is a stage involved in observational learning.¹] [The seven-year-old boys are more likely to actively focus on the aggressive behaviours and associated consequences if the model is similar to them, which in this case involved being of the same sex.²]

I have identified attention as the stage of observational learning that demonstrates the advantage of using a male model.¹

I have justified why using a male model in the experiment is an advantage, with reference to the stage of attention.²

d. [The children in condition 1 are more likely to learn aggressive behaviour.¹][This is because they are observing a model who is being reinforced for their aggressive behaviour.²][Watching a model receive a positive consequence for their aggressive behaviour can enhance the children's motivation and make them more likely to reproduce the behaviour, despite not being reinforced directly.³]

✓ ✗ I have stated that the children in condition 1 are more likely to learn aggressive behaviour.¹

✓ ✗ I have explained why children in condition 1 are more likely to learn aggressive behaviour, with reference to how the model is being reinforced.²

✓ ✗ I have further explained why children in condition 1 are more likely to learn aggressive behaviour, with reference to the impact of the model's reinforcement.³

✓ ✗ I have stated that An is unlikely to learn how to use chopsticks from classical conditioning.¹

✓ ✗ I have justified my response by explaining how classical conditioning involves learning involuntary responses.²

✓ ✗ I have further justified my response by explaining how learning to use chopsticks involves a voluntary response.³

✓ ✗ I have referred to the character's name (An) in my response, and to the scenario.

b. [An will need to progress through the stage of attention by actively focusing on how her dad uses chopsticks, such as watching how he holds them.¹][She would then need to progress through the stage of retention, by forming a mental representation of how her dad uses chopsticks.²][An will then need to progress through the stage of reproduction, meaning she needs to have the physical and mental capabilities to replicate her dad's behaviour, such as having adequate motor skills in her hands.³][An will also need to progress through the stage of motivation, in which An needs to have the desire to learn how to use chopsticks.⁴][If An successfully uses chopsticks and is reinforced by receiving dessert, she is likely to use chopsticks again in the future as she has progressed through the reinforcement stage.⁵]

✓ ✗ I have explained how An can progress through the stage of attention.¹

✓ ✗ I have explained how An can progress through the stage of retention.²

✓ ✗ I have explained how An can progress through the stage of reproduction.³

✓ ✗ I have explained how An can progress through the stage of motivation.⁴

✓ ✗ I have explained how An can progress through the stage of reinforcement.⁵

✓ ✗ I have referred to the character's name (An) in my response, and to the scenario.

Evaluate

20. [Attention is a stage of observational learning.¹][The viewers of the ad are more likely to actively focus on the perfume and encode information about it if it is associated with someone famous.²][Motivation is another stage of observational learning.³][The viewers of the ad are more likely to be motivated to wear the perfume because they may desire to be like the celebrity.⁴]

✓ ✗ I have identified one stage involved in observational learning.¹

✓ ✗ I have justified why using a celebrity to advertise the perfume is a strength, with reference to the stage of observational learning.²

✓ ✗ I have identified another stage involved in observational learning.³

✓ ✗ I have justified why using a celebrity to advertise the perfume is a strength, with reference to the other stage of observational learning.⁴

Other acceptable answers include:

- the stages of retention or reinforcement. Reproduction was not an acceptable answer as it is not considered relevant to the scenario.

Questions from multiple lessons

21. A

22. a. [An is unlikely to learn how to use chopsticks from classical conditioning.¹][This is because classical conditioning involves learning involuntary responses through the pairing of two stimuli (the neutral and unconditioned stimuli).²][As using chopsticks is a voluntary response, classical conditioning is not a suitable method of learning in this scenario.³]

4D Aboriginal and Torres Strait Islander approaches to learning

Theory review

- I; IV; V. *Systems of knowledge are developed by communities working together and sharing traditional expertise and knowledge, informed by culture, and consist of information that is highly interconnected.*
- C. *Dance is not an element of the Aboriginal learning framework but rather part of the non-verbal element, which involves sharing knowledge through non-verbal means, including dance, art, and observation.*
- B. False. *Learning is embedded in relationships. Specifically, through relationships between concepts, relationships between learner and teacher, and relationships between an individual and their wider community.*
- C. *Individuals from Indigenous communities learn not only from their school teacher but also their community. They learn about their connection with each other and the land and younger generations often learn by observing and interacting with the older generations.*
- B. In Indigenous communities, learning is not **segmented** but rather, a **holistic** process. *In Aboriginal and Torres Strait Islander communities, students do not just learn about one thing at a time. They learn and understand the connections between concepts, creating a holistic process of learning.*

Assessment skills

Perfect your phrasing

6. A 7. B

Compare and evaluate

8. A 9. C 10. D 11. D

Exam-style

Remember and understand

12. B
13. [Systems of knowledge are developed by communities working together and sharing traditional expertise and knowledge.¹] [For example, learning occurs through people coming together and sharing their knowledge.²]
- I have explained a way in which systems of knowledge are composed.¹
-
- I have provided an example of how systems of knowledge are composed.²
-
14. [Aboriginal and Torres Strait Islander peoples approach learning through story-sharing.¹] [In this method, learning takes place through narrative and story-sharing.²] [For example, Aboriginal and Torres Strait Islander peoples may share Dreaming stories to communicate complex knowledge relating to the natural world.³]

I have identified a method that Aboriginal and Torres Strait Islander peoples approach learning.¹

I have explained this method.²

I have provided an example of this method.³

Apply and analyse

15. [Systems of knowledge means that knowledge and skills are based on interconnected social, physical, and spiritual understandings, and in turn, inform survival and contribute to a strong sense of identity.¹]

I have explained what is meant by a system of knowledge.¹

16. [Bindi can teach using a relationship between concepts.¹] [For example, she can link a geographical landmark in their community to a historical event significant to the Indigenous community.²] [She can also teach using a relationship between learner and teacher.³] [For example, she could foster trust in her students, take the time to get to know each of her students, and respond to their needs well, so that their learning is facilitated through her being their teacher.⁴] [Finally, Bindi can teach using relationships between an individual and their wider community.⁵] [She can take her class to watch ceremonial dances or listen to an Elder telling Dreaming stories to help them learn more in-depth about their culture.⁶]

I have suggested that Bindi can teach using a relationship between concepts.¹

I have provided an example of how Bindi can teach using a relationship between concepts.²

I have suggested that Bindi can teach using a relationship between learner and teacher.³

I have provided an example of how Bindi can teach using a relationship between learner and teacher.⁴

I have suggested that Bindi can teach using a relationship between an individual and their wider community.⁵

I have provided an example of how Bindi can teach using a relationship between an individual and their wider community.⁶

I have referred to the character's name (Bindi) in my response, and to the scenario.

Questions from multiple lessons

17. C
18. [Before conditioning, the unconditioned stimulus for Coen is the emu footprint, producing the unconditioned response of recognising that an emu was represented, while the neutral stimulus is the three-pointed V, producing no significant response.¹] [During conditioning, the neutral stimulus of the three-pointed V is repeatedly paired with the emu footprint, producing the unconditioned response for Coen of recognising that an emu was represented.²] [After the conditioning phase, the three-pointed V became the conditioned stimulus, which produced Coen's conditioned response of recognising that the three-pointed V represented an emu.³]

- I have described what happened before conditioning.¹

- I have described what happened during conditioning.²

- I have described what happened after conditioning.³

- I have referred to the character's name (Coen) in my response, and to the scenario.

Chapter 4 review

Multiple choice

1. B 2. D 3. D 4. B
5. A 6. A 7. B

Short answer

8. [Attention is the first stage of observational learning in which individuals actively focus on the model's behaviour and the consequences of the behaviour.¹] [By contrast, retention is the second stage of observational learning in which individuals create a mental representation to remember the model's demonstrated behaviour.²]

I have described the attention stage of observational learning.¹

I have described the retention stage of observational learning.²

I have used comparison words, such as 'by contrast'.

9. [One difference is that classical conditioning involves learning an involuntary behaviour, whereas operant conditioning involves learning a voluntary behaviour.¹] [Another difference is that learners are passive during classical conditioning, whereas learners are active during operant conditioning.²] [A third difference is that there is no kind of consequence during classical conditioning, whereas operant conditioning requires a consequence.³]

I have identified a difference between classical conditioning and operant conditioning.¹

I have identified another difference between classical conditioning and operant conditioning.²

I have identified a third difference between classical conditioning and operant conditioning.³

I have used comparison words, such as 'whereas'.

Other acceptable answers include:

- classical conditioning involves learning a behaviour usually coordinated by the autonomic nervous system, whereas operant conditioning involves learning a behaviour usually coordinated by the somatic nervous system.

10. [During the first stage of observational learning, attention, Cruz needs to actively focus on the professional performers juggling and any consequences of their behaviour, such as an audience clapping in response to a live juggling performance.¹] [During the second stage of observational learning, retention, Cruz needs to create a mental representation in order to remember the professional performers juggling.²] [During the third stage of observational learning, reproduction, Cruz needs to have the physical and mental capabilities to replicate the juggling behaviour, such as the necessary fine motor skills required to juggle effectively.³] [During the fourth stage of observational learning, motivation, Cruz must want to reproduce the behaviour, which is likely because he wants to enter an upcoming school talent show.⁴] [During the final stage of observational learning, reinforcement, Cruz must receive a positive consequence for juggling, such as being praised by his friends when he juggles at the talent show, which acts as positive reinforcement and increases the likelihood that he will continue to juggle in the future.⁵]

I have described how Cruz could learn to juggle with reference to the attention stage of observational learning.¹

I have described how Cruz could learn to juggle with reference to the retention stage of observational learning.²

I have described how Cruz could learn to juggle with reference to the reproduction stage of observational learning.³

I have described how Cruz could learn to juggle with reference to the motivation stage of observational learning.⁴

I have described how Cruz could learn to juggle with reference to the reinforcement stage of observational learning.⁵

I have referred to the character's name (Cruz) in my response, and to the scenario.

11. a. [Aboriginal and Torres Strait Islander approaches to learning are multimodal by nature, meaning that they use a variety of methods.¹] [This is reflected by the 8 ways of Aboriginal learning framework, which demonstrates that Aboriginal and Torres Strait Islander approaches to learning use several different methods, such as story-sharing, learning maps, non-verbal methods, symbols and images, land links, non-linear methods that do not separate pieces of knowledge into distinct points, breaking down a concept into different components through the strategy of deconstruct/reconstruct, and community links.²]

I have explained what is meant by the multimodal nature of Aboriginal and Torres Strait Islander ways of knowing.¹

I have referred to the 8 ways of Aboriginal learning framework in order to illustrate the multimodal nature of Aboriginal and Torres Strait Islander ways of knowing.²

- b. [Relationships do have an important role in Aboriginal and Torres Strait Islander approaches to learning.¹][For example, this includes relationships between concepts, whereby learning is holistic and none of its approaches are completely distinct from each other,²][relationships between the learner and teacher, whereby learning begins with the relationship between teacher and learner,³][and relationships between an individual and their wider community, whereby community members are encouraged to learn from each other and to learn in order to benefit the community as a whole.⁴]

✓ ✗ I have identified that relationships have an important role in Aboriginal and Torres Strait Islander approaches to learning.¹

✓ ✗ I have justified my response with reference to relationships between concepts in Aboriginal and Torres Strait Islander approaches to learning.²

✓ ✗ I have further justified my response with reference to relationships between the learner and teacher in Aboriginal and Torres Strait Islander approaches to learning.³

✓ ✗ I have further justified my response with reference to the relationships between an individual and their wider community in Aboriginal and Torres Strait Islander approaches to learning.⁴

12. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

In relation to classical conditioning as an approach to learning, discussion of the following would be awarded:

- Classical conditioning cannot be used by Fabio to learn to bake a cake.
- Classical conditioning involves learning an involuntary behaviour, however, learning to bake a cake is instead a voluntary behaviour.

In relation to operant conditioning as an approach to learning, discussion of the following would be awarded:

- Operant conditioning can be used by Fabio to learn to bake a cake.
- Operant conditioning involves learning a voluntary behaviour, which includes baking a cake.
- According to the three-phase process of operant conditioning, the antecedent in this scenario is Fabio wanting the freedom to bake a cake independently.
- The behaviour is then that Fabio bakes a cake independently in response.
- According to the consequences of operant conditioning, Fabio would need to be reinforced for baking a cake independently in order to increase the likelihood that he will continue to bake cakes in the future.
- This could occur either through removing an undesirable stimulus (negative reinforcement) or presenting a desirable stimulus (positive reinforcement).
- For example, negative reinforcement could involve Fabio being relieved from house chores because he baked a cake, and positive reinforcement could involve Fabio being praised by his friends and family for his efforts in baking a cake independently.

In relation to observational learning, discussion of the following would be awarded:

- Observational learning can be used by Fabio to learn to bake a cake.
- Fabio's mother would serve as a model, while Fabio would be the learner.
- Fabio would need to progress through the stages of attention, retention, reproduction, motivation, and reinforcement.
- For the attention stage, Fabio would need to actively focus on his mother as she bakes a cake and the consequences of her behaviour.
- For the retention stage, Fabio would need to create a mental representation to remember his mother's demonstrated behaviour of baking a cake.
- For the reproduction stage, Fabio must have the physical and mental capabilities to replicate the behaviour, such as the physical strength to stir the cake mixture.
- For the motivation stage, Fabio must want to reproduce the behaviour. Fabio is likely to progress through this stage because he wants the freedom to be able to bake a cake whenever he wants.
- For the reinforcement stage, Fabio must receive a consequence for baking a cake independently that makes him more likely to reproduce this behaviour again in the future. This could occur through either self-reinforcement, external reinforcement, or vicarious reinforcement.

5A Atkinson-Shiffrin multi-store model of memory

Theory review

- I; III; IV. *Encoding, storage, and retrieval all are processes involved in the Atkinson-Shiffrin multi-store model of memory.*
- B. *Sensory memory is the first store of memory. Information is detected in sensory memory, and if it is attended to, transferred into short-term memory (second store) where it can be manipulated and rehearsed, before finally being encoded and stored in long-term memory (third store).*
- B. False. *Sensory memory consists of information that is an exact replica of what is in our environment and detected from our senses.*
- A. True. *Short-term memory is also known as working memory, as when information is in our short-term memory we can consciously manipulate and 'work' on it.*
- B. False. *Information from long-term memory can be brought into short-term memory through the process of retrieval.*
- B. False. *Whilst the Atkinson-Shiffrin multi-store memory contributes to our understanding of memory by outlining the three distinct memory stores, it is not a perfect model of memory. It is important to remember that theories and models in psychology have strengths and limitations and can be challenged or critiqued. Therefore no theory or model can ever be considered perfect.*

Assessment skills

Perfect your phrasing

7. A 8. B

Data analysis

9. A 10. B

Exam-style

Remember and understand

11. C 12. A 13. C

14. [Raw information from the environment is detected by the senses and enters the sensory memory store.¹] [If this information has been attended to, then it is converted into a useable form and transferred to short-term memory for conscious processing.²]

I have outlined how raw sensory information enters the sensory memory store.¹

I have outlined how information from sensory memory is transferred to short-term memory.²

Apply and analyse

15. B 16. C

17. [The process of memory involved in Aristotle remembering and telling his story from year four is retrieval.¹] [Retrieval involves accessing previously stored information from long-term memory and using it in short-term (working) memory at a later time, as Aristotle is doing by retrieving his memory from year four and sharing it with his friend.²]

I have identified that the process of memory involved is retrieval.¹

I have explained the process of retrieval and how it is relevant to this scenario.²

I have referred to the character's name (Aristotle) in my response, and to the scenario.

Other acceptable answers include:

- the process of storage, as this information has been stored in Aristotle's long-term memory to be used at a later time.

18. [The voice recording which reads out time tables enters her sensory memory.¹] [When she attends to this information, it is then transferred to short-term memory.²] [In her short-term memory, Shalya actively manipulates the information by rehearsing it in her head.³] [This rehearsal helps encode the information from short-term memory into long-term memory where it is stored for future use.⁴]

I have discussed how the voice recording of time tables enters her sensory memory.¹

I have discussed how by attending to this information, it is transferred to short-term memory.²

I have discussed how Shalya rehearses the information in her short-term memory.³

I have discussed how rehearsal helps encode the information into long-term memory.⁴

I have referred to the character's name in my response (Shalya), and to the scenario.

19. a. [The data collected was quantitative.¹]

I have identified that the data collected was quantitative.¹

- b. [The independent variable is whether classical music is listened to or not,¹] [and the dependent variable is the ability to recall information.²]

I have identified the independent variable as being whether music was listened to or not.¹

I have identified the dependent variable as the ability to recall information.²

Other acceptable answers include:

- the dependent variable being the number of word pairings participants were able to recall.

c. [The results of Caterina's study could not be generalised to the population of high school students¹][as a convenience sample was used, which may make the results non-representative of the population.²]

✓ ✗ I have identified that the results could not be generalised to the population of research.¹

✓ ✗ I have explained a reason as to why the results could not be generalised.²

Other acceptable answers include:

- the use of a small sample size
- the presence of extraneous variables e.g. individual participant differences.

d. [Sensory memory is the store involved in the entry point of music.¹][Short-term memory is the memory store involved in verbally recalling the word pairings.²]

✓ ✗ I have identified sensory memory as the store involved in the entry point of music.¹

✓ ✗ I have identified short-term memory as the store involved in verbally recalling the word pairings.²

Evaluate

20. [Findings from memory studies show the distinction between short-term and long-term memory and thus provide evidence for this model, enhancing its explanatory power.¹][However, the model may be considered oversimplified as other psychologists suggest that short-term memory is more complex and involves different components, thus limiting its explanatory power.²][Therefore, while the Atkinson-Shiffrin model is substantial in its power to explain and distinguish between the different stores of memory, the oversimplification of the model limits the explanatory power.³]

✓ ✗ I have evaluated the explanatory power of the Atkinson-Shiffrin model of memory by considering its strengths.¹

✓ ✗ I have further evaluated the explanatory power of the Atkinson-Shiffrin model of memory by considering its limitations.²

✓ ✗ I have made a concluding evaluation of the explanatory power of the Atkinson-Shiffrin model of memory.³

Questions from multiple lessons

21. C 22. D

23. [Long-term memory has a relatively permanent duration.¹][This duration may be impacted by the process of long-term depression which refers to the repeated low-intensity co-activation of post-synaptic neurons, resulting in the long-lasting weakening of synaptic connections.²][This may negatively impact the memory store of long-term memory which stores information for later use.³][Therefore, long-term depression may at times affect the information stored in long-term memory by reducing the duration of long-term memory, causing some memories which are meant to be relatively permanent to become lost due to the weakening of synaptic connections associated with this memory.⁴]

✓ ✗ I have identified the duration of long-term memory.¹

✓ ✗ I have explained the process of long-term depression.²

✓ ✗ I have related the process of long-term depression to long-term memory.³

✓ ✗ I have explained the impact of long-term depression on the information stored in long-term memory.⁴

✓ ✗ I have used the language of long-term depression, specifically referring to the repeated low-intensity co-activation of post-synaptic neurons.

5B Brain structures involved in memory

Theory review

1. A. False. *There are different types of long-term memory and they can be broadly categorised into explicit and implicit memories.*
2. B. *Explicit memory is also known as declarative memory as these memories can be declared or stated out loud.*
3. A. Explicit memory consists of **semantic** and **episodic** memories. *Explicit memory consists of semantic and episodic memory, while implicit memory consists of procedural and classically conditioned memory.*
4. A. True. *Procedural and classically conditioned memories are both types of implicit memory that do not involve conscious retrieval.*
5. B. False. *While the neocortex is involved in the storage of long-term memories, it does not store all explicit and implicit memories. For example, the cerebellum encodes and stores procedural memories while the neocortex stores explicit memories.*

Assessment skills

Compare and evaluate

6. A 7. A 8. A 9. C
10. B

Exam-style

Remember and understand

11. D 12. A 13. C
14. [Explicit memory is consciously retrieved,¹][whereas implicit memory is retrieved without conscious awareness.²]

✓ ✗ I have outlined a feature of explicit memory.¹

✓ ✗ I have outlined a feature of implicit memory.²

✓ ✗ I have used a comparison word, such as 'whereas'.

Other acceptable answers include:

- that explicit memory is declarative whereas implicit memory is non-declarative
- that explicit memory is retrieved voluntarily whereas implicit memory is retrieved involuntarily.

15. [The role of the hippocampus is to encode explicit memories¹] [and the role of the cerebellum is to encode implicit procedural memories.²]

I have outlined the role of the hippocampus in relation to memory.¹

I have outlined the role of the cerebellum in relation to memory.²

Apply and analyse

16. B 17. D 18. B

19. a. [Hiro's emotional fear response represents an implicit classically conditioned memory.¹]

I have identified the type of memory that represents Hiro's emotional response to the clown as an implicit classically conditioned memory.¹

I have referred to the character's name (Hiro) in my response, and to the scenario.

b. [The amygdala is the brain structure that is involved in encoding the emotional components of the memories, such as the fear Hiro felt when he was presented with the jack-in-the-box.¹]

I have outlined the role of the amygdala in the encoding of conditioned emotional responses.¹

I have referred to the character's name (Hiro) in my response, and to the scenario.

c. [The ethical consideration of informed consent was breached.¹] [This is because Hiro's mother was not informed of the experiment and did not provide consent for Hiro to participate.²] [The ethical consideration of withdrawal was breached.³] [This is because Dr Tsumi did not allow Hiro's mother to withdraw him from the experiment.⁴]

I have identified one ethical consideration that was breached.¹

I have justified why the ethical consideration was breached.²

I have identified another ethical consideration that was breached.³

I have justified why the ethical consideration was breached.⁴

I have referred to the characters' names (Hiro and Dr Tsumi) in my response, and to the scenario.

Other acceptable answers include:

- any other ethical consideration that was breached, such as voluntary participation and deception, as long as it was adequately justified using information from the case study.

20. a. [The type of memory that allowed Theodore to remember facts about the Russian revolution is semantic memory, which is a type of explicit memory.¹]

I have identified that semantic memory is the type of memory involved.¹

I have referred to the character's name (Theodore) in my response, and to the scenario.

b. [The brain structure involved when Theodore encoded this memory was the hippocampus.¹] [This is because the hippocampus encodes explicit memories, which is the type of memory involved in his knowledge of facts about the Russian revolution.²]

I have identified that the hippocampus was the brain structure involved in the encoding of Theodore's memory.¹

I have justified why the hippocampus would be involved in encoding Theodore's memory.²

I have referred to the character's name (Theodore) in my response, and to the scenario.

c. [This memory would have been stored in Theodore's neocortex.¹]

I have identified that this memory would have been stored in the neocortex.¹

I have referred to the character's name (Theodore) in my response, and to the scenario.

Questions from multiple lessons

21. B

22. a. [The type of long-term memory involved in learning how to perform a dance routine is procedural memory, which is a type of implicit memory.¹]

I have identified that the type of long-term memory is procedural memory.¹

b. [Millie has achieved the stage of attention,¹] [as seen through her actively focusing on her mum teach the dance routine.²] [Millie has also achieved the stage of retention,³] [as seen through her storing the steps of the routine as a mental representation, demonstrated by her ability to remember the steps.⁴] [However, Millie has not achieved reproduction.⁵] [This could be due to her physical inability to perform the advanced routine, despite her mentally remembering the steps.⁶]

- I have identified that Millie achieved the stage of attention.¹

- I have explained how Millie has achieved attention.²

- I have identified that Millie achieved the stage of retention.³

- I have explained how Millie has achieved retention.⁴

- I have identified that Millie has not achieved the stage of reproduction.⁵

- I have explained how Millie has not achieved reproduction.⁶

- I have referred to the character's name (Millie) in my response, and to the scenario.

- I have described neurofibrillary tangles as a neurological lesion that characterises Alzheimer's disease.¹

- I have described amyloid plaques as a neurological lesion that characterises Alzheimer's disease.²

5C The role of episodic and semantic memory in remembering and imagining

Theory review

1. A. True. *The retrieval of autobiographical events involves an overlap between episodic memory, which involves the experience and feelings associated with the event, and semantic memory, which involves general knowledge associated with the event, such as where it took place.*
2. B. False. *Possible imagined futures are hypothetical scenarios that play out in an individual's mind. The possible imagined future constructed by an individual may differ largely from what actually happens.*
3. B. *Neurodegenerative diseases are characterised by the progressive loss of neurons, and in Alzheimer's disease there is a progressive loss of neurons in the brain, particularly the hippocampus.*
4. A. Aphantasia is characterised by an inability to generate **mental imagery**. *Aphantasia is a phenomenon that involves individuals lacking the capacity to generate visual forms of mental imagery.*

Assessment skills

Text analysis

5. A 6. B 7. B

Perfect your phrasing

8. B 9. B

Exam-style

Remember and understand

10. C 11. B
12. [One neurological lesion that characterises Alzheimer's disease is the presence of neurofibrillary tangles, which are a build-up of the protein tau.¹] [Another neurological lesion that characterises Alzheimer's disease is the presence of amyloid plaques, which are fragments of beta-amyloid that form insoluble plaques.²]

Apply and analyse

13. B 14. D 15. C

16. [Daphne is drawing the episodic memory of her last plane flight in which listening to music helped calm her down when she was feeling nauseous.¹] [Daphne is also drawing on her semantic memory of the knowledge that a particular medication she can buy from her local chemist can help treat motion sickness.²] [Daphne is using both of these memories to help construct a possible imagined future of her taking the motion sickness tablets in the morning of her flight and relaxing on the plane by listening to music.³]

- I have explained how Daphne is drawing on her episodic memory.¹

- I have explained how Daphne is drawing on her semantic memory.²

- I have explained how Daphne uses both episodic and semantic memory to construct a possible imagined future.³

- I have referred to the character's name (Daphne) in my response, and to the scenario.

17. a. [Alzheimer's disease is a neurodegenerative disease that involves the progressive loss of neurons in the brain and is characterised by memory decline.¹] [Alzheimer's involves lesions that contribute to the degeneration and loss of neurons in the hippocampus.²] [The hippocampus is involved in the retrieval of autobiographical memories, therefore due to damage to the hippocampus, Yusuf may be unable to retrieve autobiographical memories.³]

- I have outlined what Alzheimer's disease is.¹

- I have explained how Alzheimer's disease involves the loss of neurons in the hippocampus.²

- I have explained how the loss of neurons in the hippocampus impacts Yusuf's ability to retrieve autobiographical events.³

- I have referred to the character's name (Yusuf) in my response, and to the scenario.

- b. [Zoya has aphantasia, which means she lacks the capacity to generate visual forms of mental imagery.¹] [Due to her inability to generate visual forms of mental imagery, she will be unable to retrieve the vividly, detailed visual components of the autobiographical event,²] [such as the visual image of her grandfather at the celebration.³]

- I have outlined aphantasia.¹

- I have discussed how aphantasia can impact Zoya's retrieval of the visual components of the autobiographical event.²

- I have used an example to support my answer.³

- I have referred to the character's name (Zoya) in my response, and to the scenario.

Questions from multiple lessons

18. a. [Dr Pierre used convenience sampling.¹]
- I have identified that Dr Pierre used convenience sampling.¹

- b. [Dr Pierre was unable to generalise his results because the sample of elderly patients at a hospital is not representative of all people with Alzheimer's disease.¹]
- I have explained how the sample of elderly hospital patients could not be extended to those with Alzheimer's disease.¹

 - I have referred to the character's name (Dr Pierre) in my response, and to the scenario.

Other acceptable answers include:

- Dr Pierre cannot generalise his results due to confounding variables, such as the age of patients or other illnesses that patients could have been diagnosed with.
- c. [The earliest stages of Alzheimer's disease involves a reduction of hippocampal volume due to neurofibrillary tangles and amyloid plaques, impacting short-term and episodic memory.¹]
[The effects of the medication in Dr Pierre's investigation suggests that it could protect against this decline in hippocampal volume.²][Therefore, researchers may be interested in how the use of this medication could act as a protective factor against the development of Alzheimer's disease.³]
- I have explained how Alzheimer's disease involves a reduction in hippocampal volume.¹

 - I have explained how the findings of Dr Pierre's experiment suggest that the medication could protect against the decline of hippocampal volume associated with Alzheimer's disease.²

 - I have explained why researchers would be interested in using this medication in the protection against the development of Alzheimer's disease.³

 - I have referred to the character's name (Dr Pierre) in my response, and to the scenario.

- d. [The drug is unlikely to impact semantic and episodic memory.¹][This is because the drug increases the volume of the cerebellum, which is a brain region involved in the encoding and storing of implicit procedural memories.²][Therefore, the encoding, storage, and retrieval of semantic and episodic, which are explicit memories, will stay relatively unaffected as they involve different brain regions.³]
- I have stated that the drug will not impact semantic and episodic memory.¹

 - I have outlined the role of the cerebellum in memory.²

 - I have drawn upon the cerebellum's role in memory to justify that the drug will not impact semantic and episodic memory.³

5D Mnemonics

Theory review

1. A. True. *Mnemonics are strategies that assist in encoding, storing, and retrieving memories.*
2. I; III; IV. *The method of loci, acrostics, and acronyms are examples of mnemonics associated with written traditions while Sung narratives and Songlines are associated with oral traditions.*
3. III; IV. *Acrostics and acronyms both involve using the first letter of items as a retrieval cue for target information.*
4. B. Visualisation is necessary when using **the method of loci and Songlines**. *The method of loci and Songlines can involve creating mental visual imagery of items and familiar locations.*
5. B. *Both sung narratives and songlines involve the use of harmony and rhythm to tell stories and share information.*

Assessment skills

Compare and evaluate

6. B 7. B 8. II; IV 9. B
10. C

Exam-style

Remember and understand

11. C 12. D
13. [An acronym is a mnemonic device in which the first letter of items are formed into a pronounceable word to aid memory.¹]
[For example, the acronym BODMAS can be used to aid memory of the order of operations which are brackets, order, division, multiplication, addition, and subtraction.²]
- I have described what is meant by an acronym.¹

 - I have provided an example of an acronym.²

14. [Both acronyms and acrostics use the first letters of items as retrieval cues to target information.¹][However, acronyms use the first letter of items to form a pronounceable word whereas acrostics use the first letter of items to construct a phrase, rhyme, or poem.²]

I have outlined one similarity between acronyms and acrostics.¹

I have outlined one difference between acronyms and acrostics.²

I have used comparison words, such as 'whereas'.

15. [Songlines are songs sung as a family or community travels through Country and spaces in the landscape that record journeys, link important sites, and describe ways to live, care for, and nurture Country.¹][Songlines use rhythm and narrative to communicate necessary cultural information linked to different stories placed in the landscape, which can enhance the encoding of this information.²][When Songlines are sung and individuals walk through the landscape, individuals are able to retrieve the information that is linked to the different stories and places.³]

I have explained what is meant by Songlines.¹

I have suggested how Songlines can assist in encoding information.²

I have suggested how Songlines can assist in retrieving information.³

Apply and analyse

16. B 17. A 18. B 19. B

20. [Loki can use the method of loci by converting his list of things to do in mental images that he can associate with familiar locations in his mind.¹][First, Loki must visualise a familiar route or place, such as his house.²][Secondly, Loki will need to select several memorable places in his house, such as his bedroom or kitchen.³][Loki will then need to create visual imagery for his list of things to do, such as a giant glittery suit to help him remember to go to the dry cleaners.⁴][Then Loki will need to link each item to one of the identified landmarks, for example by imagining the giant glittery suit sitting at his table in the kitchen.⁵][When Loki needs to retrieve his list of things to do, he can mentally walk through his house and retrieve each item by observing them at the locations he placed them.⁶]

I have explained what is meant by the method of loci.¹

I have explained the first step in the method of loci.²

I have explained the second step in the method of loci.³

I have explained the third step in the method of loci.⁴

I have explained the fourth step in the method of loci.⁵

I have explained the fifth step in the method of loci.⁶

I have referred to the character's name (Loki) in my response, and to the scenario.

Questions from multiple lessons

21. a. [The independent variable is the use of mnemonic devices.¹][The dependent variable is the number of countries remembered from the list.²]

I have identified the independent variable.¹

I have identified the dependent variable.²

- b. [The type of memory that is being investigated in this experiment is semantic memory, which is a type of explicit memory.¹]

I have identified that semantic memory is the type of memory involved.¹

- c. [Mnemonics require individuals to consciously organise and link new semantic information to fit in with existing information in long-term memory, improving the encoding of this information.¹][Additionally, these meaningful links can help create strong retrieval pathways to this semantic information, improving retrieval.²]

I have suggested how mnemonics can be effective in encoding semantic information.¹

I have suggested how mnemonics can be effective in retrieving semantic information.²

Chapter 5 review

Multiple choice

1. B 2. C 3. D 4. B
5. B

Short answer

6. a. [Dr Carey would have recorded subjective qualitative data.¹]

I have identified that Dr Carey would have recorded subjective qualitative data.¹

- b. [The type of long-term memory that would be impacted by damage to the hippocampus is explicit memory.¹][This is because the hippocampus encodes explicit memory.²]

I have outlined that explicit memory would be impacted by damage to the hippocampus.¹

I have justified my response by referring to the hippocampus as being the structure involved in encoding explicit memory.²

- c. [Dr Carey would have violated the ethical concept of non-maleficence (no-harm principle).¹][This is seen in her desire to produce brain trauma in her participants by damaging their hippocampus, which may harm them both psychologically and physiologically. This would violate the no-harm principle which safeguards participants from harm.²]

- I have identified an ethical concept which Dr Carey violated.¹

- I have justified my response by referring to the scenario.²

- I have referred to the character's name (Dr Carey) in my response, and to the scenario.

d. [Group A is not likely to show a fear response to the green square.¹][This is because Group A have damage to their amygdala, which is essential for the encoding of the implicit emotional component of classically conditioned memories.²][In comparison, Group B are likely to show a fear response to the green square.³][This is because group B have an intact amygdala and therefore can encode the emotionally arousing component of classically conditioned memories.⁴]

- I have predicted that Group A is not likely to show a fear response to the green square.¹

- I have justified why Group A is not likely to show a fear response to the green square, with reference the impact of damage to the amygdala.²

- I have predicted that Group B is likely to show a fear response to the green square.³

- I have justified why Group B is likely to show a fear response to the green square, with reference to the impact of an intact amygdala.⁴

7. a. [The type of long-term memory involved in performing the steps of a dance routine is procedural memory.¹]

- I have identified that the type of long-term memory is procedural memory.¹

b. [The cerebellum is the primary structure responsible for the storage of long-term implicit procedural memory.¹]

- I have described the role of the cerebellum in the storage of long-term implicit procedural memory.¹

c. [Semantic long-term memory refers to declarative memory of general knowledge, including facts, words, and numbers. By contrast, episodic long-term memory refers to declarative memory relating to autobiographical events and personal experiences.¹][An example of semantic memory is knowing the name of a country's capital city,²][while an example of episodic memory is remembering a birthday dinner of a friend.³]

- I have described a difference between semantic and episodic long-term memory.¹

- I have provided an example of a semantic memory.²

- I have provided an example of an episodic memory.³

- I have used comparison words, such as 'by contrast.'

d. [Meryl may construct a possible imagined future in which she imagines herself singing the lyrics of the song and focusing on the back wall while performing the dance routine.¹][To do this, Meryl might draw on her episodic memory of the last time she performed a dance routine at an audition in which focusing on a spot on the wall helped her.²][She might also draw on her semantic memory of the lyrics of the song she has to perform.³]

- I have suggested how Meryl may construct a possible imagined future.¹

- I have explained the role of episodic memory in constructing this possible imagined future.²

- I have explained the role of semantic memory in constructing this possible imagined future.³

- I have referred to the character's name (Meryl) in my response, and to the scenario.

e. [Idina has aphantasia, which means she lacks the capacity to generate visual forms of mental imagery.¹][Due to her inability to generate visual forms of mental imagery, she will be unable to retrieve the vividly, detailed visual components of her memories of blocking the scene, impairing her ability to construct a possible imagine future of performing the scene that contains these visual components.²]

- I have outlined aphantasia.¹

- I have explained how this may impair her ability to construct a possible imagined future.²

- I have referred to the character's name (Idina) in my response, and to the scenario.

8. a. [An example of an acrostic that can help Annifred remember to buy her school supplies is People Rapidly Escape Sinking Ships.¹][An example of an acronym that can help Annifred remember to buy her school supplies is PRESS.²]

- I have provided an example of an acrostic.¹

- I have provided an example of an acronym.²

- I have referred to the character's name (Annifred) in my response, and to the scenario.

Other acceptable answers include:

- any other examples of acrostic or acronyms Annifred could have used to remember her school supplies, such as SPERS, so long as they used the first letter of each school supply.
- b. [Acrostics are mnemonic devices in which the first letter of items are constructed into a phrase, rhyme, or poem.¹][Acronyms are mnemonic devices in which the first letter of items are formed into a pronounceable word to aid memory.²][They both link new information to familiar words, phrases, and sounds stored in long-term memory and the first letter acts as a retrieval cue to help bring the targeted information into short-term memory, therefore enhancing retrieval of information.³]

I have described acrostics.¹

I have described acronyms.²

I have explained that they both use the first letter as a retrieval cue which enhances retrieval of information long-term memory.³

9. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students will need to discuss the Atkinson-Shiffrin multi-store model of memory, including the function of the three stores and the flow of information from sensory memory to long-term memory. Students need to link their discussion to valid examples of a person's memory of their day at the beach. Discussion of the following would be awarded:

- how incoming information, such as seeing a sandcastle, would enter sensory memory. If this information is attended to then it would be transferred to short-term memory.
- how the person could consciously manipulate the information of the sandcastle in short-term memory and then encode this information to long-term memory.
- how this information of the sandcastle is stored in and could be retrieved from long-term memory.
- explanation of how not all memories from the day at the beach would be encoded and/or successfully retrieved, from long-term memory to short-term memory.

Students may discuss the interaction between brain structures in the formation of a person's long-term memory, ensuring to refer to the different examples and types of long-term memory. The following examples would be awarded:

- an individual may learn how to surf and this implicit procedural memory would be encoded by the basal ganglia and cerebellum and stored in their cerebellum.
- an individual may learn about species of sea creatures and this explicit semantic memory would be encoded by their hippocampus and stored in their neocortex.
- an individual may remember playing in the sand and this explicit episodic memory would be encoded by their hippocampus and stored in their neocortex.
- an individual may have a scary encounter with a shark when they are in the water and this could potentially become a classically conditioned memory that would be encoded by the amygdala.

Students may discuss the role of semantic and episodic memory in retrieving the autobiographical memory. Discussion of the following would be awarded:

- an explanation of how the person may have retrieved an autobiographical event, such as building a sandcastle.
- an explanation of how the person will draw on semantic memory when retrieving the autobiographical event, such as by retrieving information of what was used to build the sandcastle, e.g. bucket and shovel.
- an explanation of how the person will draw on episodic memory when retrieving the autobiographical event, such as by retrieving information of how they had a lot of fun building the sandcastle.

Students may discuss the use of mnemonic devices to help encode, store, and retrieve information. The following examples would be awarded:

- an explanation of how the person may have used the method of loci to remember information related to the beach, such as the items they needed to bring to the beach, by linking this information a familiar location in their minds.
- an explanation of how the person may have used an acrostic to remember information related to their day at the beach, such as the steps involved in surfing.
- an explanation of how the person may have used an acronym to remember information related to their day at the beach, such as what they needed to bring to the beach or steps involved in surfing.

Unit 3 AOS 2 review

SAC assessment 1

1. a.

| Role of learner/ participant | Classical conditioning | Operant conditioning | Observational learning |
|---------------------------------|------------------------|----------------------|------------------------|
| Active | | X | X |
| Passive | X | | |

I have identified the role of the participant as passive during classical conditioning.¹

I have identified the role of the participant as active during operant conditioning.²

I have identified the role of the learner as active during observational learning.³

b. [In Activity 1, salivating in response to the sound of the bell is involuntary in nature,¹] [In Activity 2, students picking up the decided object is voluntary in nature.²] [In Activity 3, learning the handshake is also voluntary in nature.³]

I have outlined the behaviour learnt in Activity 1 was involuntary.¹

I have outlined the behaviour learnt in Activity 2 was voluntary.²

I have outlined the behaviour learnt in Activity 3 was voluntary.³

I have referred to the activities.

c. [The role of a learner is active and their behaviour is voluntary in Aboriginal and Torres Strait Islander approaches to learning.¹] [This is most similar to observational learning, as the learner is also active and their behaviour is voluntary.²]

I have identified that the role of a learner is active and their behaviour is voluntary in Aboriginal and Torres Strait Islander approaches to learning.¹

I have suggested that observational learning is the most similar method of learning to Aboriginal and Torres Strait Islander approaches to learning.²

Other acceptable answers include:

- operant conditioning as learners have an active role and their behaviour is also voluntary.

2. [Activity 1 involved classical conditioning, while Activity 2 involved operant conditioning.¹] [A similarity is that both activities demonstrated a three-phase learning process.²] [Another similarity is that both activities needed several trials in order for learning to occur.³] [A difference that occurred in the activities is that Activity 2 involved learning a voluntary behaviour, whereas Activity 1 involved learning an involuntary behaviour.⁴] [Another difference between the two activities is that learners were active during Activity 2, whereas learners were passive during Activity 1.⁵]

✓ ✗ I have identified that Activity 1 involved classical conditioning while Activity 2 involved operant conditioning.¹

✓ ✗ I have outlined a similarity between Activity 1 and Activity 2.²

✓ ✗ I have outlined another similarity between Activity 1 and Activity 2.³

✓ ✗ I have outlined a difference between Activity 1 and Activity 2.⁴

✓ ✗ I have outlined another difference between Activity 1 and Activity 2.⁵

✓ ✗ I have used comparison words, such as 'whereas.'

3. a. [A similarity between observational learning and Aboriginal and Torres Strait Islander approaches to learning is that learning is more effective when the model (or teacher) is familiar to and liked by the learner.¹] [In Aboriginal and Torres Strait Islander approaches to learning, learning is deeply embedded in relationships, whereby the learner and the teacher must know and trust each other in order for learning to be successful.²] [Comparatively, in observational learning, an individual is more likely to pay attention to a model if the model is familiar and perceived positively by the learner.³]

✓ ✗ I have identified a similarity between Aboriginal and Torres Strait Islander approaches to learning and observational learning.¹

✓ ✗ I have explained this similarity in relation to Aboriginal and Torres Strait Islander approaches to learning.²

✓ ✗ I have explained this similarity in relation to observational learning.³

Other acceptable answers include:

- observational learning and Aboriginal and Torres Strait Islander approaches to learning both rely on observation.

b. [When learning how to crack an egg using a YouTube video, an individual will need to actively focus on how the model in the video holds the egg.¹] [They would then need to form a mental representation of how the model in the video holds the egg.²] [The individual will need to have the physical and mental capabilities to replicate the model's behaviour.³] [They will also need to have the desire to learn how to crack an egg.⁴] [If the individual successfully cracks an egg and is reinforced by receiving praise, they are likely to crack an egg again in the future.⁵]

✓ ✗ I have explained how an individual can progress through the stage of attention.¹

✓ ✗ I have explained how an individual can progress through the stage of retention.²

✓ ✗ I have explained how an individual can progress through the stage of reproduction.³

✓ ✗ I have explained how an individual can progress through the stage of motivation.⁴

✓ ✗ I have explained how an individual can progress through the stage of reinforcement.⁵

✓ ✗ I have referred to the scenario.

4. a. [In Activity 1, an involuntary association between a neutral stimulus (the bell) and an unconditioned stimulus (Wizz Fizz) was created through the process of classical conditioning.¹] [Before conditioning, the unconditioned stimulus (UCS) for the participant is the Wizz Fizz, producing the unconditioned response (UCR) of salivation, while the neutral stimulus (NS) is the bell, producing no significant response.²] [During conditioning, the NS is repeatedly presented immediately prior to the UCS eliciting the UCR.³] [After conditioning, as there is repeated association between the NS and the UCS, the NS, of the bell, becomes the conditioned stimulus (CS) and produces the conditioned response, which is participants salivating to the bell being sounded without the presence of the UCS.⁴]

✓ ✗ I have identified the association that was created in Activity 1.¹

✓ ✗ I have described the before conditioning phase of participants learning to salivate in response to the bell.²

✓ ✗ I have described the during conditioning phase of participants learning to salivate in response to the bell.³

✓ ✗ I have described the after conditioning phase of participants learning to salivate in response to the bell.⁴

✓ ✗ I have referred to Activity 1.

b. [In Activity 2, an association was learnt through the process of operant conditioning.¹] [The antecedent in this scenario is the participant having to find the decided object.²] [The behaviour is the participant moving towards the decided object.³] [The consequence is that the participant receives a clap if they move close to the decided object, which acts as positive reinforcement and increases the likelihood that the participant will continue to move toward the decided object.⁴]

✓ ✗ I have identified operant conditioning as the process of learning demonstrated in activity 2.¹

✓ ✗ I have described the antecedent in activity 2.²

✓ ✗ I have described the behaviour in activity 2.³

✓ ✗ I have described the consequence in activity 2.⁴

5. [In Activity 2, the desired response of picking up the decided object had to be voluntary.¹] [However, in classical conditioning, the learnt response is involuntary, and is therefore not effective.²] [In observational learning, a model needs to demonstrate the behaviour that the learner needs to learn.³] [However, no model was used in Activity 2, so observational learning would also not have been effective.⁴] [A core aspect of operant conditioning is that the consequence that a learner receives determines the likelihood of a behaviour being repeated.⁵] [Because being applauded when they moved closer to the decided object was a positive reinforcement, the likelihood of the learner repeating the behaviour was increased, causing the desired response to be achieved.⁶] [Therefore, operant conditioning was the most effective learning method to be carried out in Activity 2.⁷]

I have described that the response learnt in Activity 2 had to be voluntary.¹

I have explained that classical conditioning would not have been effective in Activity 2 as the learnt response is involuntary.²

I have described that a model is needed to demonstrate learning in observational learning.³

I have explained that observational learning would not have been effective in Activity 2 as there was no model.⁴

I have identified a consequence determining the likelihood of behaviour being repeated as a core aspect of operant conditioning.⁵

I have explained that operant conditioning was effective in achieving the desired response in Activity 2.⁶

I have concluded that operant conditioning was the most effective learning method to be carried out in Activity 2.⁷

6. [Aboriginal and Torres Strait Islander approaches to learning are multimodal,¹] [meaning that they utilise a variety of methods, such as story-sharing, non-verbal communication, and community links.²] [Furthermore, learning is inherently tied to Country,³] [meaning that the relevance of information and the process of learning is shaped by both geographical boundaries of a particular language or cultural group's traditional lands, and the spiritual, emotional, and intellectual connections to and within it.⁴]

I have identified multimodality as a unique element of Aboriginal and Torres Strait Islander approaches to learning.¹

I have explained this element.²

I have identified connection to Country as a unique element of Aboriginal and Torres Strait Islander approaches to learning.³

I have explained this element.⁴

Other acceptable answers include:

- Aboriginal and Torres Strait Islander approaches situate learning within a system, whereby all information, knowledge, and people are interconnected.

Unit 3 AOS 2 review

SAC assessment 2

1. a. [Danny failed to recall episodic memory of his first day of Prep,¹] [such as how he felt throughout the day.²] [This is episodic memory as it consisted of personal experiences that are unique to him.³]

I have identified the type of memory that Danny failed to recall on his first day of Prep.¹

I have provided an example of the type of memory that Danny failed to recall on his first day of Prep.²

I have described the type of memory that Danny failed to recall on his first day of Prep.³

I have referred to the character's name (Danny) in my response, and to the scenario.

Other acceptable answers include:

- semantic memory, such as the location of his classroom.

- b. [When creating a possible imagined future, such as imagining the next day of school, an individual has to draw on past experiences from their episodic memory.¹] [However, because Danny struggles to recall episodic memories, he may have been unable to construct a possible imagined future of the next day that incorporated his personal experiences from his first day of Prep.²]

I have explained that individuals have to draw on past experiences from episodic memory to create a possible imagined future.¹

I have suggested that Danny may have been unable to construct a possible imagined future as he struggles to recall episodic memories.²

I have referred to the character's name (Danny) in my response, and to the scenario.

2. a. [Mnemonics are devices or techniques used to aid the encoding, storage, and retrieval of information.¹] [They may be useful for Danny as they could help to organise and link new information to fit in with existing information in long-term memory, improving the initial encoding of information.²]

I have explained what mnemonics are.¹

I have suggested how they may be useful for Danny in terms of encoding.²

I have referred to the character's name (Danny) in my response, and to the scenario.

- b. [Danny could use an acronym, which is a mnemonic device in which the first letters of items form a pronounceable word to aid memory.¹] [For example, he could use the acronym ARTSY to remember that Amelia, Rafa, Toby, Sheron, and Yaakov are in his art project group.²] [Alternatively, Danny could use an acrostic, by creating a phrase, rhyme, or poem using the first letters of his peers' names to aid his memory.³] [For example, he could use the acrostic 'Always Remember To Share Yoghurt' to remember the people in his art project group.⁴]

- I have explained what acronyms are.¹

- I have suggested an acronym that Danny can use to remember the people in his art project group.²

- I have explained what acrostics are.³

- I have suggested an acrostic that Danny can use to remember the people in his art project group.⁴

- I have referred to the character's name (Danny) in my response, and to the scenario.

c. [Danny can use the method of loci by converting his school morning routine into mental images that he can associate with familiar locations in his mind.¹][First, Danny must visualise a familiar route or place, such as his house.²][Secondly, Danny will need to select several memorable places in his house, such as his bedroom or kitchen.³][Danny will then need to create visual imagery for his list of things to do, such as a giant pigeon to help him remember to put his bag into his pigeon hole.⁴][Then Danny will need to link each item to one of the identified landmarks, for example by imagining the giant pigeon sitting by the front door.⁵][When Danny needs to retrieve his list of things to do, he can mentally walk through his house and retrieve each item by observing them at the locations he placed them.⁶]

- I have explained what is meant by the method of loci.¹

- I have explained the first step in the method of loci.²

- I have explained the second step in the method of loci.³

- I have explained the third step in the method of loci.⁴

- I have explained the fourth step in the method of loci.⁵

- I have explained the fifth step in the method of loci.⁶

- I have referred to the character's name (Danny) in my response, and to the scenario.

3. a. [Danny seems to be unable to encode information from short-term memory (working memory) to long-term memory, such as the names of peers in his groups.¹][This means that information is not being stored in long-term memory and may be lost in short-term memory due to displacement or decay.²][Therefore, due to having reduced ability to encode and store information, Danny's short-term memory functioning is impaired.³]

- I have suggested that Danny may have a reduced ability to encode information.¹

- I have suggested that Danny may have a reduced ability to store information.²

- I have evaluated that Danny's short-term memory store may be impaired.³

- I have referred to the character's name (Danny) in my response, and to the scenario.

b. [For someone who does not experience memory problems, information would first enter sensory memory¹][and, if attended to, it would be converted and transferred to short-term memory.²][From there, the information can be consciously manipulated and rehearsed, which can increase the likelihood that it is encoded into long-term memory.³][When information is encoded from short-term memory and long-term memory, it is stored in the brain, however, it can be retrieved and brought back into short-term memory.⁴][Compared to another student, a lot of information may either be lost from Danny's short-term memory or not encoded into long-term memory,⁵][causing it to not be stored and making it more difficult to retrieve and remember.⁶]

- I have explained that information first enters sensory memory.¹

- I have explained that information is then transferred to short-term memory if attended to.²

- I have explained that information is encoded into long-term memory if attended to and rehearsed.³

- I have explained that information can be retrieved from long-term memory into short-term memory.⁴

- I have suggested that, compared to another student, a lot of information may be lost from Danny's short-term memory.⁵

- I have compared Danny's ability to retrieve information from long-term memory to another student.⁶

- I have referred to the character's name (Danny) in my response, and to the scenario.

c. [Studies conducted on memory suggest a distinction between short-term and long-term memory, providing evidence for the Atkinson-Shiffrin model and enhancing its explanatory power.¹][However, the model is considered oversimplified as other psychologists suggest that short-term memory is more complex and involves different components, thus limiting its explanatory power.²][Furthermore, it does not explain unique scenarios, such as Danny's, in which a memory store does not function as predicted.³][Therefore, while the Atkinson-Shiffrin model has the power to distinguish between the different stores of memory, the oversimplification and limited explanations provided by the model limits the explanatory power.⁴]

- I have evaluated the explanatory power of the Atkinson-Shiffrin model of memory by considering its strengths.¹

- I have evaluated the explanatory power of the Atkinson-Shiffrin model of memory by considering its limitations.²

- I have further evaluated the explanatory power of the Atkinson-Shiffrin model of memory by considering Danny's situation.³

- I have made a concluding evaluation of the explanatory power of the Atkinson-Shiffrin model of memory.⁴

- I have referred to the character's name (Danny) in my response, and to the scenario.

4. a. [The hippocampus is responsible for encoding explicit memories,¹] [while the neocortex is a brain structure responsible for storing explicit memories.²] [Because remembering the location of his classroom is an explicit memory,³] [if Danny's hippocampus or neocortex is damaged, he would not be able to encode or store this memory, causing him to have difficulty remembering where his classroom is.⁴]

I have outlined the role of the hippocampus in relation to memory.¹

I have outlined the role of the neocortex in relation to memory.²

I have identified that remembering the location of a classroom is an explicit memory.³

I have suggested why Danny cannot remember where his classroom is located.⁴

I have referred to the character's name (Danny) in my response, and to the scenario.

b. [The amygdala is a brain structure that is primarily involved in encoding the emotional components of memories.¹] [The occupational therapist's suspicion that Danny's amygdala is damaged may be correct as, if Danny's amygdala is damaged, he would not have been able to encode, and hence remember, how he felt on his first day of Prep.²]

I have outlined the role of the amygdala in relation to memory.¹

I have justified, with reference to Danny's inability to remember how he felt on his first day of Prep, why the occupational therapist's suspicion is accurate.²

I have referred to the character's name (Danny) in my response, and to the scenario.

5. [Aphantasia is a phenomenon in which individuals lack the capacity to generate visual forms of mental imagery.¹] [Because Danny can visualise how his classroom looks and generate a mental image, it is unlikely that he has aphantasia.²] [Furthermore, Alzheimer's disease is a neurodegenerative disease that involves the progressive loss of neurons in the brain and is characterised by memory decline.³] [As Alzheimer's disease involves memory decline that worsens as individuals age and is therefore associated with older age, it is unlikely that Danny would have Alzheimer's disease as he is only five-years-old.⁴]

I have described aphantasia.¹

I have justified why Danny is unlikely to have aphantasia.²

I have described Alzheimer's disease.³

I have justified why Danny is unlikely to have Alzheimer's disease.⁴

I have referred to the character's name (Danny) in my response, and to the scenario.

6A Sleep as a psychological construct

Theory review

- B. False. *Consciousness is not fixed as it varies along a continuum.*
- I; II; III. *All options are correct statements about sleep.*
- B. False. *Normal waking sleep does not exist. Instead normal waking describes a state of consciousness.*
- A. True. *REM sleep is characterised by a highly active brain.*
- B. NREM sleep is divided into **three** stages. *Sleep is divided into two stages: NREM and REM. NREM is subdivided into three stages, whereas REM is not subdivided into any further stages.*

Assessment skills

Perfect your phrasing

6. A 7. B 8. B

Compare and evaluate

9. B 10. C 11. D

Exam-style

Remember and understand

12. C 13. B
14. a. [A psychological construct is an agreed upon description and understanding of psychological phenomena that cannot be overtly measured or observed.¹]

I have outlined what a psychological construct is.¹

- b. [Sleep is an example of a psychological construct.¹]

I have identified an example of a psychological construct.¹

Other acceptable answers include:

- consciousness.

15. [Rapid eye movement (REM) sleep makes up around 20–25% of a typical sleep episode, whereas non-rapid eye movement (NREM) sleep makes up around 75–80% of a typical sleep episode.¹]
[REM is one singular stage of sleep, whereas NREM sleep contains three stages.²]

I have identified one difference between rapid eye movement (REM) and non-rapid eye movement (NREM) sleep.¹

I have identified a second difference between rapid eye movement (REM) and non-rapid eye movement (NREM) sleep.²

I have used comparison words, such as 'whereas'.

16. [NREM sleep is non-rapid eye movement sleep and involves a lack of rapid eye movement and is subdivided into three different stages.¹][A characteristic of NREM sleep is that the sleeper is considered to have an less active brain and a body that can be active during this type of sleep.²]

I have described NREM sleep.¹

I have described NREM sleep in further detail by providing a characteristic of NREM sleep.²

Apply and analyse

17. C

18. [Fredrick is most likely in REM sleep.¹][This is because Fredrick is completely motionless meaning that he is likely experiencing muscle paralysis, a characteristic of REM sleep.²]

I have identified that Fredrick is most likely to be in REM sleep.¹

I have justified my response.²

I have referred to the character's name (Fredrick) in my response, and to the scenario.

19. a. [Jaimie is likely to be experiencing an altered state of consciousness.¹]

I have identified that Jaimie is likely to be experiencing an altered state of consciousness.¹

I have referred to the character's name (Jaimie) in my response, and to the scenario.

- b. [Jaimie would be in NREM stage 1 when transitioning from being awake to being asleep.¹][This would involve Jaimie moving into a very light stage of sleep from which they could be easily woken.²]

I have identified that Jaimie would be in NREM stage.¹

I have described this stage of sleep.²

I have referred to the character's name (Jaimie) in my response, and to the scenario.

- c. [Jaimie is likely to experience only the first sleep cycle of a sleep episode because the class is 90 minutes.¹][Jaimie's sleep cycle would begin with NREM stage 1, in which they would transition from being awake to a light stage of sleep and would likely experience a hypnic jerk.²][Then Jaimie would move into NREM stage 2, which is still a light stage of sleep but is the first stage they would be completely asleep.³][Then Jaimie would move into NREM stage 3, which is a deep stage of sleep and they would feel drowsy if woken in this stage.⁴][Jaimie would then transition into REM sleep, in which they would experience muscle paralysis.⁵]

- I have stated that Jaimie would be likely to experience only the first sleep cycle of a sleep episode.¹

- I have discussed this sleep cycle, ensuring to describe NREM stage 1.²

- I have discussed this sleep cycle, ensuring to describe NREM stage 2.³

- I have discussed this sleep cycle, ensuring to describe NREM stage 3.⁴

- I have discussed this sleep cycle, ensuring to describe REM sleep.⁵

- I have referred to the character's name (Jamie) in my response, and to the scenario.

d. i. [The operationalised independent variable would be conducting a 15-minute guided meditation as compared to classes with no meditation.¹][The operationalised dependent variable would be the level of concentration of each member of the class, as measured by the mean number of off-task behaviours counted by the teacher during a lesson.²]

- I have identified and operationalised the independent variable.¹

- I have identified and operationalised the dependent variable.²

ii. [The teacher acting as the experimenter may be an extraneous variable.¹][This is because they may not be able to accurately count the number of off-task behaviours of an entire class, especially while teaching, therefore the results may be biased or inaccurate.²]

- I have identified an extraneous or confounding variable.¹

- I have explained how this may impact the results.²

Questions from multiple lessons

20. [The sympathetic nervous system, which is a division of the autonomic nervous system, is responsible for these physiological changes.¹][This division of the nervous system activates visceral muscles, organs, and glands, preparing the body to respond to a threat or stressor.²]

- I have identified the sympathetic nervous system as the division of the nervous system responsible for these physiological changes.¹

- I have described this division of the nervous system.²

6B Measuring sleep

Theory review

1. B. False. *Sleep is difficult to observe and measure as it is a psychological construct.*
2. I; II; III. *All three options are ways that sleep can be measured.*
3. B. False. *An EEG measures the electrical activity of the brain.*
4. I; III. *Sleep diaries are records containing self-reported qualitative descriptions from an individual about their sleep, which involves how much they sleep and how they feel after sleep.*
5. B. False. *Video monitoring is one of the ways that sleep can be measured, although it has both advantages and disadvantages.*

Assessment skills

Perfect your phrasing

6. A 7. B 8. B

Data analysis

9. A 10. B 11. C 12. A

Exam-style

Remember and understand

13. D 14. B
15. [One way to measure sleep is by using an electroencephalograph (EEG).¹][An EEG is a device that detects, amplifies, and records the electrical activity of the brain. It shows the types of brain waves an individual is experiencing and therefore can indicate whether an individual is asleep or awake.²]
- I have identified one way to measure sleep.¹

 - I have described how this measure of sleep is used.²

Note: To achieve full marks, you need to describe how the measure is used to specifically measure sleep, rather than just broadly describing what it is. For example, in the exemplar response, it would not be sufficient to only say 'an EEG is a device that detects, amplifies, and records the electrical activity of the brain'. This is because the description alone does not describe how an EEG is used to measure sleep.

16. [An EEG would show higher frequency in REM sleep and lower frequency in NREM sleep.¹][An EEG would show lower amplitude in REM sleep and higher amplitude in NREM sleep.²]
- I have described frequencies in REM and NREM sleep.¹

 - I have described amplitudes in REM and NREM sleep.²

Apply and analyse

17. C

18. a. [A sleep diary can collect qualitative data.¹][A sleep diary may be useful for Divya as she can record detailed information about her sleep which may help her doctor have more knowledge and understanding of Divya's sleep patterns and therefore be able to suggest effective ways she can improve her sleep patterns.²]

I have identified a type of data a sleep diary collects.¹

I have suggested one reason why a sleep diary may be useful for Divya.²

Other acceptable answers include:

- Quantitative data.

- b. [Divya is likely to include the duration of time she spent asleep in her sleep diary.¹][Divya is also likely to include how many times she woke up during the night in her sleep diary.²]

I have described one point of information Divya would be likely to include in her sleep diary.¹

I have described a second point of information Divya would be likely to include in her sleep diary.²

I have referred to the character's name (Divya) in my response, and to the scenario.

- c. [Divya, with the help of a professional, could use an EMG.¹][An electromyograph (EMG) is a device that detects, amplifies, and records the electrical activity of the body's muscles.²]

I have identified another measure of sleep Divya could use other than a sleep diary.¹

I have described this measure of sleep.²

I have referred to the character's name (Divya) in my response, and to the scenario.

19. a. [An EOG is an electro-oculograph and is a device that detects, amplifies, and records the electrical activity of the muscles that move the eyes.¹]

I have described what an EOG is.¹

- b. [During REM sleep, Noam's EOG recording would likely display high levels of activity.¹][This is because REM sleep is characterised by rapid movements of the eyes.²][In NREM sleep, Noam's EOG recording would likely display low levels of activity.³][This is because NREM sleep is associated with little to no movement of the eyes.⁴]

I have identified Noam's likely EOG reading in REM sleep.¹

I have justified my prediction.²

I have identified Noam's likely EOG reading in NREM sleep.³

I have justified my prediction.⁴

I have referred to the character's name (Noam) in my response, and to the scenario.

- c. [Because Noam has normal sleeping patterns, the video monitoring should show Noam lying in bed during the night with minimal awakenings.¹]

I have outlined what video monitoring may show in Noam's situation.¹

Other acceptable answers include:

- some minor movements, such as tossing and turning.

Questions from multiple lessons

20. a. [The central nervous system.¹]

I have identified the central nervous system as the division of the nervous system that the brain is part of.¹

- b. [The somatic nervous system.¹]

I have identified the somatic nervous system as the division of the nervous system responsible for this movement.¹

- c. [NREM sleep.¹]

I have identified NREM sleep as the type of sleep that a person is experiencing when they are moving.¹

6C Regulation of sleep-wake patterns

Theory review

1. A. True. *Circadian rhythms, ultradian rhythms, the SCN, and melatonin are all biological mechanisms that regulate the sleep-wake cycle.*
2. I; II; III. *All three options are involved in the sleep-wake cycle.*
3. A. True. *Ultradian rhythms occur repeatedly in a cycle that lasts less than 24 hours, whereas circadian rhythms last 24 hours.*
4. B. False. *Although melatonin is released at night, it does not promote wakefulness, rather, it promotes sleep.*
5. A. True. *The SCN receives internal and external cues about when it is the appropriate time to send signals to the pineal gland to release melatonin.*

Assessment skills

Perfect your phrasing

6. A 7. A 8. B

Text analysis

9. B 10. A 11. D 12. A

Exam-style

Remember and understand

13. A 14. A
15. [The pineal gland is the area of the brain responsible for the release of melatonin.¹]
- I have identified the pineal gland as the area of the brain responsible for the release of melatonin.¹
-
16. [The suprachiasmatic nucleus (SCN) receives internal cues and external cues.¹][Once the SCN receives these cues it sends signals to the pineal gland to release melatonin at night-time.²][The pineal gland will then release the hormone melatonin at night-time to promote sleep. Therefore, through receiving and sending signals, the SCN regulates the sleep-wake cycle.³]
- I have explained that the SCN receives internal and external cues.¹
-
- I have explained that the SCN sends signals to the pineal gland to release melatonin.²
-
- I have explained that the pineal gland releases melatonin, which promotes sleep.³
-
17. [Circadian rhythms are biological and behavioural changes that occur as part of a cycle that lasts around 24 hours,¹][whereas ultradian rhythms are biological and behavioural changes that occur in a cycle that lasts less than 24 hours.²][An example of a circadian rhythm is the sleep-wake cycle and an example of an ultradian rhythm is the 90-minute sleep cycles within a sleep episode.³]

I have described circadian rhythms.¹

I have described ultradian rhythms.²

I have used examples to support my answer.³

I have used comparison words, such as 'whereas'.

Apply and analyse

18. C 19. C

20. [Gia's suprachiasmatic nucleus (SCN) will receive internal cues.¹][Gia's SCN will also receive external cues.²][After receiving these cues, Gia's SCN will send signals to her pineal gland to release the hormone melatonin.³][Her pineal gland will then release melatonin into her bloodstream, which will promote a state of calm and relaxation and help Gia feel ready to sleep.⁴]

I have explained that Gia's SCN will receive internal cues.¹

I have explained that Gia's SCN will receive external cues.²

I have explained that Gia's SCN will respond to these cues by signalling to her pineal gland.³

I have explained that Gia's pineal gland will then release melatonin which promotes sleep.⁴

I have used psychological terminology, such as the suprachiasmatic nucleus, the pineal gland, and melatonin.

I have referred to the character's name (Gia) in my response, and to the scenario.

Questions from multiple lessons

21. B

22. [The role of cortisol in the sleep-wake cycle is to promote wakefulness in the morning when released by the adrenal cortex,¹][whereas the role of cortisol in the stress response is to help the body initiate and maintain heightened arousal by increasing blood sugar levels and energising the body in response to both short-term and long-term stressors.²]

I have outlined the role of cortisol in the sleep-wake cycle.¹

I have outlined the role of cortisol in the stress response.²

I have used comparison words in my answer, such as 'whereas'.

Other acceptable answers include:

- You could have identified a similarity between the role of cortisol in the sleep-wake cycle and the stress response, such as that they both increase arousal.

6D Sleep across the lifespan

Theory review

1. A. True. *Characteristics of sleep change across age groups.*
2. B. False. *There are explanations for the changes in sleep across the lifespan, such as changes in physiological and cognitive demands across the lifespan.*
3. I; II. *Duration of sleep and proportion of REM and NREM sleep are both characteristics of sleep that can change over time, whereas the content of dreams has not been shown to change based on age.*
4. I. *In the neonatal and infancy age groups, REM sleep is of the highest proportion compared to the rest of the lifespan.*
5. B. False. *Older adults experience the lowest amount of sleep compared to the rest of their lifespan.*

Assessment skills

Compare and evaluate

6. A 7. B 8. A

Exam-style

Remember and understand

9. B 10. D
11. [The proportion of REM sleep for newborns is 50%¹][whereas, for adolescents it is 20%.²][This is because newborns are experiencing rapid brain development and therefore, need more time spent in REM sleep than adolescents as they are not experiencing rapid brain development.³]

I have described the proportion of REM sleep for newborns.¹

I have described the proportion of REM sleep for adolescents.²

I have justified my response.³

12. [A hypnogram of an infant would show a higher proportion of REM sleep¹][and lower proportion of NREM sleep than a hypnogram of healthy adult.²]
- I have identified that a hypnogram of an infant would have a higher proportion of REM sleep than a hypnogram of a healthy adult.¹
- I have identified that a hypnogram of an infant would show a lower proportion of NREM sleep than a hypnogram of a healthy adult.²

Apply and analyse

13. C 14. A

15. a. [The time spent in REM sleep increases as the sleep episode progresses, whereas, the time spent in NREM sleep decreases as the sleep episode progresses.¹][Also, there is a greater total amount of time spent in NREM sleep compared to in REM sleep.²]

I have outlined one difference between REM and NREM sleep in the hypnogram.¹

I have outlined a second difference between REM and NREM sleep in the hypnogram.²

I have used an appropriate distinguishing word, such as 'whereas'.

Other acceptable answers include:

- NREM stage 3 is generally evident only in the first couple of sleep cycles, whereas, REM occurs throughout the night.
- NREM sleep has four stages and REM sleep has one.

- b. [The hypnogram of an infant would show a sleep duration of approximately 13.5 hours, whereas the hypnogram of a healthy adolescent only shows around 9 hours of sleep duration.¹][The hypnogram of an infant would also show that approximately 50% of the sleep episode would be in REM sleep, whereas the hypnogram of the healthy adolescent only shows approximately 20% REM sleep.²]

I have outlined one difference between the hypnogram of an infant and the hypnogram of an adolescent.¹

I have outlined a second difference between the hypnogram of an infant and the hypnogram of an adolescent.²

I have used an appropriate distinguishing word, such as 'whereas'.

Other acceptable answers include:

- The hypnogram of an infant would show that approximately 50% of the sleep episode was in NREM sleep, whereas the hypnogram of an adolescent shows approximately 80% NREM sleep.

Questions from multiple lessons

16. D

17. a. [Dr Rozario used convenience sampling.¹]

I have identified that Dr Rozario has used convenience sampling.¹

I have referred to my character's name (Dr Rozario) and to the scenario, in my response.

- b. i. [Dr Rozario may have obtained results that suggest teenagers sleep less than 8-9 hours each night, which is not as predicted.¹]

I have suggested results that Dr. Rozario may have obtained for the teenage group.¹

I have referred to my character's name (Dr Rozario) and to the scenario, in my response.

- ii. [These results may have occurred because teenagers experience delayed sleep phase onset. This means that, although teenagers require 8–9 hours of sleep, they tend to sleep less due to their delayed body clock not aligning with their lifestyle commitments, such as school.¹] [Therefore, the results may not support Dr. Rozario's prediction as she has not accounted for delayed sleep phase onset affecting the sleep-wake cycle in the teenage group.²]

I have described that these results may have occurred due to delayed sleep phase onset occurring in teenagers.¹

I have explained how this would have affected the prediction.²

I have referred to my character's name (Dr. Rozario) and to the scenario, in my response.

- c. [Informed consent involves an experimenter explaining procedures, potential risks and rights to participants prior to them agreeing to participate in research.¹] [When working with children under the age of 18, informed consent must be obtained from both the child participant and their legal parent or guardian, therefore Dr. Rozario needs to change her informed consent procedure.²]

I have explained informed consent.¹

I have explained why Dr Rozario would need to update her informed consent procedures.²

I have referred to my character's name (Dr Rozario) and to the scenario, in my response.

Chapter 6 review

Multiple choice

1. B 2. A 3. C 4. D
5. B

Short answer

6. [Hypnogram 1 displays an elderly person's sleep episode.¹] [This is because hypnogram 1 shows a sleep duration that is around 6 hours, which is characteristic of an elderly person's sleep episode.²]

I have identified that hypnogram 1 displays an elderly person's sleep episode.¹

I have provided an appropriate justification with reference to a feature of hypnogram 1.²

7. [Sleep cycles are a proportion of a sleep episode in which the sleeper progresses through stages of REM and NREM sleep, lasting around 90 minutes.¹] [Sleep cycles are therefore an example of an ultradian rhythm because they occur within 24 hours (90 minutes) and involve physiological changes throughout as the sleeper changes between REM and NREM sleep.²]

I have defined sleep cycles.¹

I have described why sleep cycles are an example of an ultradian rhythm.²

8. [REM sleep is a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity in the skeletal muscles,¹] [whereas NREM sleep is a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages.²]

I have described REM sleep.¹

I have described NREM sleep.²

I have used comparison words in my answer, such as 'whereas'.

9. a. [Carla's sleep cycle will begin with NREM stage 1, in which they would transition from being awake to a light stage of sleep and would likely experience a hypnic jerk.¹] [Then Carla would move into NREM stage 2, which is still a light stage of sleep but is the first stage they would be completely asleep.²] [Then Carla would move into NREM stage 3, which is a deep stage of sleep and they would feel drowsy if woken in this stage.³] [Lastly, Carla would transition into REM sleep, in which they may experience vivid dreams.⁴]

I have described this sleep cycle, ensuring to describe NREM stage 1.¹

I have described this sleep cycle, ensuring to describe NREM stage 2.²

I have described this sleep cycle, ensuring to describe NREM stage 3.³

I have described this sleep cycle, ensuring to describe REM sleep.⁴

I have referred to the character's name (Carla) in my response, and to the scenario.

- b. [Carla could measure their sleep via an electroencephalograph (EEG).¹] [This could provide information on the amount of REM and NREM sleep Carla is experiencing and may indicate awakenings or disruptions during the night, therefore helping to provide information on why Carla is feeling tired.²]

I have suggested one way Carla could measure their sleep.¹

I have explained why this may help provide on information on why Carla feels tired.²

10. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students will need to provide a detailed description of Maggie's night of sleep. Discussion of the following would be awarded:

- Discussion of the transition from being awake to sleep, with reference to the regulating mechanisms of the sleep-wake cycle. The suprachiasmatic nucleus (SCN) and melatonin would need to be discussed, with reference to external and internal cues and the role of melatonin as a hormone that promotes sleep.
- Discussion of the first sleep cycle Maggie will experience. The lack of REM sleep at the beginning of this first sleep cycle would need to be discussed.
- Discussion of REM and NREM sleep, and the substages of NREM sleep.

Students will need to discuss Maggie's sleep requirements and compare them to her parents. Discussion of the following would be awarded:

- Discussion of the sleep requirements of an adolescent, with reference to duration and proportion of REM and NREM sleep.
- Discussion of the sleep requirements of an adult, with reference to duration and proportion of REM and NREM sleep.

Students will need to suggest different measures Maggie could use to investigate her potential sleep-walking. Discussion of the following would be awarded:

- Discussion of how video monitoring could be used by Maggie.
- Discussion of how an EMG could be used by Maggie. This would involve discussion of muscle movement during NREM sleep.
- Descriptions of these measures and their strengths and limitations should also be discussed for a high-scoring response.

7A Sleep deprivation

Theory review

1. B. False. *Not only does sleep deprivation include quantity of sleep (number of hours) but it also includes quality of sleep. Sleep deprivation can also be partial, meaning an individual has been awake for a minimum of 17 hours.*
2. A. Sleep deprivation can **negatively** impact functioning. *Sleep deprivation can have negative impacts on an individual's emotions, cognition, and behaviours.*
3. I; II; III. *Sleep deprivation does not influence genetic functioning, but it can influence cognitive, behavioural, and affective functioning.*
4. I; II. *Emotions and irritability are both related to affective functioning, while fatigue is related to behavioural functioning, and concentration is related to cognitive functioning.*
5. B. False. *Although specific levels of blood alcohol concentration show links to sleep deprivation, a 'high' blood alcohol concentration is subjective, and also is not the exact same as an individual experiencing sleep deprivation. The statement in this question is too broad and general to be true.*

Assessment skills

Data analysis

6. A 7. B 8. C 9. A

Exam-style

Remember and understand

10. B 11. C
12. [Behavioural effects of sleep deprivation are the changes in behaviour and ability to control behaviour that arise from sleep deprivation.¹][They can include an increased likelihood of engaging in risk-taking behaviours.²]

I have described the behavioural effects of sleep deprivation.¹

I have used an example to support my answer.²

Other acceptable answers include:

- other examples of behavioural effects of sleep deprivation, such as microsleeps, sleep inertia, or reduced motor control.

13. [A person who is experiencing full sleep deprivation would likely have worse cognitive abilities than when they have a BAC of 0.05,¹ [as a person experiencing full sleep deprivation has more comparable cognitive abilities to a person with a higher BAC of 0.10.²]

I have suggested that they would not have the same effect.¹

I have justified this by explaining that one night of full sleep deprivation has the equivalent effect of a BAC of 0.10 on cognition.²

14. [Affective changes a person might experience if they are sleep deprived include amplified emotional responses,¹ [increased irritability and moodiness,² [and reduced empathy towards others.³]

I have identified one affective change a person might experience if they are sleep deprived.¹

I have identified a second affective change a person might experience if they are sleep deprived.²

I have identified a third affective change a person might experience if they are sleep deprived.³

Apply and analyse

15. B 16. B

17. [An affective change Evan may experience is increased irritability, therefore he may be more likely to get angry at a co-worker unnecessarily.¹][A behavioural change Evan may experience is microsleping, in which he may involuntarily fall asleep for a fraction of a second, whilst at work.²][A cognitive change Evan may experience is poorer concentration, in which he may struggle to focus on his work tasks and have to take more breaks than usual.³]

I have discussed an affective change Evan might experience at work due to his sleep deprivation.¹

I have discussed a behavioural change Evan might experience at work due to his sleep deprivation.²

I have discussed a cognitive change Evan might experience at work due to his sleep deprivation.³

I have referred to the character's name (Evan), and to the scenario.

Questions from multiple lessons

18. A 19. C 20. D

7B Circadian rhythm sleep disorders

Theory review

1. A. True. *Sleep disorders are characterised by a disruption to an individual's sleep and wake patterns.*
2. I; II; III. *Sleep disorders can involve all three options.*
3. B. False. *Circadian rhythm sleep disorders can be caused by lifestyle changes, but they can also be caused by biological changes.*
4. II; III. *Shift work is not a type of sleep disorder, rather, it is a cause of sleep disorders.*
5. B. False. *Bright light therapy is a treatment for, not an effect of, circadian rhythm sleep disorders.*
6. I; II; III. *Exposure to light only at night-time is not a necessary condition for bright light therapy to be successful, as it depends on the individual's disorder when they should be exposed to bright light.*

Assessment skills

Perfect your phrasing

7. B 8. A 9. B

Compare and evaluate

10. B 11. A 12. C

Exam-style

Remember and understand

13. C
14. [Bright light therapy is a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source.¹]

I have described bright light therapy.¹

15. [Shift work is an occupation that involves working at unusual hours, such as working overnight.¹][Therefore, shift work can disrupt the circadian rhythm as individuals have to work during normal sleep time and have to sleep during the day, meaning that external cues are out of sync with internal cues and potentially leading to a circadian rhythm sleep disorder.²]

I have described shift work.¹

I have described how shift work can lead to a circadian rhythm sleep disorder.²

Apply and analyse

16. A 17. D

18. a. [Nelson's SCN would be receiving external cues, such as light and dark.¹][Nelson's SCN would not be receiving internal cues.²]

I have stated that Nelson's SCN would be receiving external cues.¹

I have stated that Nelson's SCN would not be receiving internal cues.²

I have referred to the character's name (Nelson) in my response, and to the scenario.

- b. [Bright light therapy is a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source.¹][Nelson could expose themselves to a bright light source for a minimum of 15 minutes in the evenings when they begin to feel sleepy to promote wakefulness.²][This will help shift Nelson's circadian rhythm to a more normal time by acting as an external cue, which will then help the suprachiasmatic nucleus send signals for melatonin release later in the night.³]

I have described bright light therapy.¹

I have described how Nelson would use bright light therapy.²

I have described the effect this will have on Nelson's circadian rhythm.³

I have referred to the character's name (Nelson) in my response, and to the scenario.

Evaluate

19. [Dr Smith's use of bright light therapy is unlikely to be effective.¹][This is because Dr Smith is only exposing Sam to the bright light source for two minutes, which is not a long enough period of time to be effective.²][Additionally, Dr Smith has incorrectly told Sam to stare directly into the bright light source, which is not safe exposure, and therefore may damage Sam's eyes.³]

I have evaluated Dr Smith's use of bright light therapy.¹

I have justified my evaluation by discussing a factor influencing bright light therapy.²

I have justified my evaluation by discussing another factor influencing bright light therapy.³

I have referred to the characters' names (Dr Smith and Sam) in my response, and to the scenario.

Questions from multiple lessons

20. a. [Shift work is an occupation that involves working at unusual hours, such as working overnight.¹][Therefore, Tahlia's clients may have difficulty sleeping due to circadian rhythm disruption, as they are receiving external cues that do not align with their internal cues.²]

I have explained shift work.¹

I have explained why Tahlia's clients may have difficulty sleeping.²

I have referred to the character's name (Tahlia) in my response, and to the scenario.

- b. [A cognitive effect of sleep deprivation that Tahlia's clients may experience is a lack of concentration.¹]

I have identified a cognitive effect of sleep deprivation that Tahlia's clients may experience.¹

- c. [EEG readings are likely to show high frequency and low amplitude brain waves, but lower frequency and higher amplitude than normal-waking consciousness.¹][This is because Tahlia's clients are feeling sleepy, so they are not highly aware but also not asleep, so their brain activity is likely to be similar to what occurs when transitioning from wakefulness to NREM stage 1 sleep.²]

- I have suggested potential EEG readings that Tahlia's clients may show when they are feeling sleepy at work.¹

- I have justified my response.²

- I have referred to the character's name (Tahlia) in my response, and to the scenario.

7C Improving sleep

Theory review

- A. True. *Sleep hygiene refers to the practices and habits an individual has that can promote their sleep patterns.*
- I; II; IV. *Sleeping in a comfortable space, avoiding bright screens, and exercising early in the day can promote sleep, whereas consuming caffeine close to sleep time can promote wakefulness.*
- A. True. *Research highlights that there is a bidirectional relationship between sleep and mental wellbeing.*
- B. False. *External cues from the environment can be referred to as zeitgebers and they play an important role in sleep-wake patterns.*
- I; II; IV. *Light, temperature, and eating patterns are examples of zeitgebers and therefore can influence the circadian rhythm.*

Assessment skills

Perfect your phrasing

6. A 7. A

Text analysis

8. A 9. B 10. C 11. A

Exam-style

Remember and understand

12. B 13. A
14. [Sleep hygiene refers to the practices and habits that promote an individual's sleep.¹] [For example, sleeping in a quiet space is a sleep hygiene practice that can make it easier for an individual to fall asleep and stay asleep.²]

- I have described sleep hygiene.¹

- I have used an example to describe how sleep hygiene can improve sleep-wake patterns.²

Other acceptable answers include:

- other examples of sleep hygiene practices, such as limiting caffeine intake close to sleep.

15. [Adequate quality and quantity of sleep are important for good mental wellbeing, as there is a link between poor sleep and mental illness.¹] [As sleep hygiene enables individuals to experience an adequate quality and quantity of sleep, it can also improve mental wellbeing.²]

- I have described that adequate sleep is linked to mental wellbeing.¹

- I have described that sleep hygiene can improve mental wellbeing.²

16. [Zeitgebers are external cues from the environment that influence the circadian rhythm and therefore can influence sleep-wake patterns.¹] [The presence of daylight and blue light act as a zeitgeber by signalling to the brain to promote wakefulness and reduce sleepiness.²]

- I have explained how zeitgebers can influence sleep-wake patterns.¹

- I have explained how daylight and blue light act as zeitgebers.²

Apply and analyse

17. D 18. A

19. [Mallena could improve her sleep hygiene which involves her changing her practices and habits near bedtime so that they promote sleep rather than promote wakefulness.¹] [This may involve her removing her current practice of studying in her bed to strengthen the association of bed and sleep.²] [This could also involve her adopting a new practice of ensuring she sleeps in a dark and quiet environment.³] [Mallena could also use zeitgebers to improve her sleep, which are external cues from the environmental that influence the circadian rhythm.⁴] [This could involve Mallena not using her phone before sleep to avoid blue light exposure close to bed, which can promote wakefulness through inhibiting melatonin release.⁵] [This could also involve Mallena considering her eating and drinking patterns and whether they may be influencing her sleep, such as whether she consumes caffeine late in the day.⁶]

- I have explained sleep hygiene and how it promotes sleep.¹

- I have discussed how Mallena could change one of her already existing practices to improve her sleep-wake patterns.²

- I have discussed how Mallena could introduce a new practice to improve her sleep-wake patterns.³

- I have discussed zeitgebers and how it promotes sleep.⁴

- I have discussed how Mallena could use one of her already existing zeitgebers to improve her sleep-wake patterns.⁵

- I have discussed how Mallena could use a new zeitgeber to improve her sleep-wake patterns.⁶

- I have referred to the character's name (Mallena) in my response, and to the scenario.

Evaluate

20. [Veronica's advice is unlikely to be effective for Yusuf.¹] [This is because she first suggested that Yusuf increase his alcohol intake before sleep, which can make it easier to fall asleep, but ultimately reduces sleep quality and will not help Yusuf sleep better.²] [Additionally, Veronica also advised Yusuf to increase his caffeine intake during the day which is likely to make it harder for Yusuf to fall asleep at night time as caffeine blocks neurotransmitters that promote sleep.³]

- I have evaluated that Veronica's advice is unlikely to be effective for Yusuf.¹
-
- I have evaluated the first piece of advice Veronica gave to Yusuf as ineffective.²
-
- I have evaluated the second piece of advice Veronica gave to Yusuf as ineffective.³
-
- I have referred to the characters' names (Veronica and Yusuf) in my response, and to the scenario.
-

Questions from multiple lessons

21. [A mnemonic device Akira could use is an acronym, in which the first letters of items are formed into a pronounceable word to aid memory.¹] [An example of an acronym Akira could use is DENCE.²]

- I have suggested a mnemonic device Akira could use.¹
-
- I have suggested an example of my chosen mnemonic device.²
-
- I have referred to the character's name (Akira) in my response, and to the scenario.
-

Other acceptable answers include:

- acrostic
- method of loci.

Chapter 7 review

Multiple choice

1. A 2. C 3. B 4. B
5. A

Short answer

6. a. [Keisha is likely to be experiencing partial sleep deprivation.¹] [This is due to her having an inadequate quantity of sleep as she only slept for five hours, however, this is not total sleep deprivation as she still had some sleep within the 24 hours.²]

- I have identified that Keisha is experiencing partial sleep deprivation.¹
-
- I have referred to the scenario to justify that Keisha is experiencing partial sleep deprivation.²
-
- I have referred to the character's name (Keisha) in my response, and to the scenario.
-

- b. [Research suggests that experiencing full sleep deprivation is similar to a BAC of 0.10 in terms of cognition and affect.¹] [People who are fully sleep deprived compared to people who have a BAC of 0.10 are likely to experience a similar decline in cognitive functioning, such as reduced concentration.²] [They are also likely to experience similar impacts on affective functioning, such as increased irritability and anger.³]

I have compared full sleep deprivation and a BAC of 0.10.¹

I have compared full sleep deprivation and a BAC of 0.10 in terms of cognition.²

I have compared full sleep deprivation and a BAC of 0.10 in terms of affect.³

I have used comparison words in my response such as 'compared to'.

- c. [Due to experiencing partial sleep deprivation, Keisha may find it harder to concentrate on the road during her driving test, therefore having reduced cognitive functioning.¹] [Keisha may also experience slower reaction times, making it harder for her to quickly respond to activity on the road. This behavioural effect may increase Keisha's likelihood of making errors or being in a car crash while sleep deprived.²]

I have identified an example of how Keisha's cognitive functioning may be impacted.¹

I have identified an example of how Keisha's behavioural functioning may be impacted.²

I have referred to the character's name (Keisha) in my response, and to the scenario.

Other acceptable answers include:

- cognitive functioning effects, such as decreased ability to direct attention
- behavioural functioning effects, such as reduced motor control and increased likelihood of engaging in risk-taking behaviour
- other effects would be accepted as long as they are appropriate examples for this scenario.

- d. [The sleep specialist is likely to tell Keisha that she is experiencing delayed sleep phase syndrome.¹] [This is because Keisha's sleeping and waking times are occurring later than appropriate.²]

I have stated that the sleep specialist may tell Keisha that she is experiencing delayed sleep phase syndrome.¹

I have justified my response by explaining what delayed sleep phase syndrome is.²

I have referred to the character's name (Keisha) in my response, and to the scenario.

e. [Bright light therapy is a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source.¹][Keisha could expose herself to a bright light source, ensuring she did not directly stare at the light, early in the morning before school for a minimum of 15 minutes over a minimum of two weeks.²][This will help shift Keisha's circadian rhythm so that her body releases melatonin earlier in the nighttime to promote sleepiness, which will then promote wakefulness earlier in the morning at an appropriate time for her to go to school.³]

I have explained bright light therapy.¹

I have explained how Keisha could use bright light therapy.²

I have explained how this could influence Keisha's circadian rhythm.³

I have referred to the character's name (Keisha) in my response, and to the scenario.

Note: A mark here is awarded for explaining how Keisha can use bright light therapy. It is important when explaining this that you address the three features of effective bright light therapy use.

7. a. [Shift work is an occupation that involves working at unusual hours, such as working overnight.¹]

I have stated what shift work is.¹

b. [Daylight as a zeitgeber is the typical light an individual is exposed to during the day and is mostly natural blue light.¹][Blue light as a zeitgeber is a type of light that can be emitted both naturally and artificially.²][Daylight will influence Jett's sleep-wake patterns as he is required to work when there is no daylight and sleep during the daylight, which may make him feel sleepy at work and awake when he needs to sleep.³][Artificial blue light may influence Jett's sleep-wake patterns as he will be exposed to bright light when working during the night, which may help keep him awake for his shift, however, he will also be exposed to natural blue light during the day when he needs to sleep.⁴]

I have described daylight as a zeitgeber.¹

I have described blue light as a zeitgeber.²

I have suggested how daylight could influence Jett's sleep-wake patterns.³

I have suggested how blue light could influence Jett's sleep-wake patterns.⁴

I have referred to the character's name (Jett) in my response, and to the scenario.

c. [Sleep hygiene is a term used to describe the practices and habits that promote an individual's sleep.¹][A sleep hygiene practice Jett could implement might be sleeping in a dark room. Jett could close all his blinds and use an eye mask during the day to help reduce his exposure to light when he requires sleep.²][This will help promote Jett's mental wellbeing because adequate quantity and quality of sleep are associated with improved mental wellbeing.³]

I have described sleep hygiene.¹

I have described a sleep hygiene practice Jett could use to maintain good sleep-wake patterns.²

I have described how this could help Jett maintain good mental wellbeing.³

I have referred to the character's name (Jett) in my response, and to the scenario.

Other acceptable answers include:

- other sleep hygiene practices, so long as they are adequately linked to Jett's situation.

8. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students will need to discuss the changes to his sleep-wake cycle that Nelson is experiencing. Discussion of the following would be awarded:

- Nelson may be experiencing a circadian rhythm sleep disorder. This is likely to be an advanced sleep phase disorder due to feeling sleepier and wakeful earlier than appropriate.
- Nelson is also likely to be experiencing partial sleep deprivation. This is because he is unable to sleep at the times his body is telling him to, due to a mismatch between internal and external cues, thus resulting in a lack of adequate quantity and quality of sleep.
- Descriptions of circadian rhythm sleep disorders, advanced sleep phase disorder, sleep deprivation, and partial sleep deprivation would be relevant.

Students will need to explore the changes to his functioning that Nelson is experiencing as a result of the changes to his sleep-wake cycle. Discussion of the following would be awarded:

- Affective effects of partial sleep deprivation. For example, increased irritability and anger.
- Behavioural effects of partial sleep deprivation. For example, an increase in microsleeps.
- Cognitive effects of partial sleep deprivation. For example, poorer concentration.
- Students would need to link these effects to Nelson's situation. For example, how they may impact his work life or his social life.

Students will need to discuss ways Nelson could improve his sleep-wake patterns. Discussion of the following would be awarded:

- Bright light therapy as a possible treatment.
- The influence of zeitgebers on Nelson's sleep-wake patterns. Students could explore Nelson's eating and drinking patterns, room temperature, and light, as potential factors that may be contributing to changes in his sleep-wake patterns. Specifically, eating and drinking patterns would be most relevant in relation to Nelson's consumption of alcohol.
- Sleep hygiene. Students could propose a range of sleep hygiene practices Nelson could implement to promote adequate quality and quantity of sleep, such as sleeping in a quiet environment.

Unit 4 AOS 1 review

SAC assessment 1

1. a. [The sleep-wake cycle is a 24-hour-cycle that is made up of time spent sleeping and time spent awake and alert.¹]

I have described the sleep-wake cycle.¹

b. [The suprachiasmatic nucleus is a biological mechanism that plays a role in regulating the sleep-wake cycle.¹]

I have identified one biological mechanism that plays a role in regulating the sleep-wake cycle.¹

Other acceptable answers include:

- melatonin
- circadian rhythm
- ultradian rhythm.

2. a. [Partial sleep deprivation is when an individual sleeps for some duration within a 24-hour-period, but the sleep duration is too short, or the quality of sleep is poor.¹]

I have stated what partial sleep deprivation is.¹

b. [A cognitive effect of partial sleep deprivation is experiencing poor concentration and a lack of focus.¹][This may impact Ms Parker in her work as she may struggle to complete her work-related tasks if she cannot pay attention and focus for long periods of time, and she may make more errors in her work if she finds it hard to concentrate.²][An affective effect of partial sleep deprivation is increased irritability due to a reduced ability to regulate emotions.³][This may impact Ms Parker in her work as she may find herself getting easily frustrated and annoyed by her colleagues and therefore may get upset at them unfairly which may lead to problems in these work relationships.⁴][A behavioural effect of partial sleep deprivation is experiencing microsleeps, which involves Ms Parker involuntarily falling asleep for a few seconds without awareness of doing so.⁵][This may impact Ms Parker's work as she may experience a microsleep in important meetings at work which may limit her ability to understand what is going on or being discussed, which also may appear unprofessional to her colleagues or managers.⁶]

I have explained a cognitive effect of partial sleep deprivation.¹

I have explained how this may impact Ms Parker's work performance.²

I have explained an affective effect of partial sleep deprivation.³

I have explained how this may impact Ms Parker's work performance.⁴

I have explained a behavioural effect of partial sleep deprivation.⁵

I have explained how this may impact Ms Parker's work performance.⁶

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

3. a. [Ms Parker's sleep diary has been used to obtain detailed information about Ms Parker's sleep patterns so that Dr Sloane can identify her sleep problem and provide effective treatment.¹]

I have outlined the purpose of Ms Parker's sleep diary.¹

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

b. [One point of information Ms Parker should include is the duration of her sleep.¹][Another point of information she should include is the number of times she woke up during her sleep.²]

I have identified one point of information Ms Parker should include in her sleep diary.¹

I have identified a second point of information Ms Parker should include in her sleep diary.²

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

Other acceptable answers include:

- quality of sleep, thoughts and feelings prior to going to sleep or after waking up, behaviour prior to going to sleep or after waking up.

c. [Using a sleep diary can be beneficial because it can provide detailed amounts of qualitative information about an individual's sleeping patterns.¹]

I have suggested why using a sleep diary can be beneficial.¹

d. [Another method Ms Parker could use to measure her sleep is through an electroencephalograph (EEG).¹][An EEG is a device that detects, amplifies, and records the electrical activity of the brain. Ms Parker would have to see a medical professional who would attach electrodes to her head to monitor her brain waves whilst she is asleep.²]

I have identified another method Ms Parker can use to measure her sleep.¹

I have described how Ms Parker can use this method to measure her sleep.²

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

Other acceptable answers include:

- electro-oculograph (EOG)
- electromyograph (EMG)
- video monitoring.

4. [Melatonin is a hormone released by the pineal gland that helps promote a state of calm and relaxation and it is important in the regulation of the sleep-wake cycle as it is released at night-time to promote sleep.¹][Therefore, Ms Parker was recommended to take melatonin as it can help promote sleep at an appropriate time and she is less likely to be awake until 2 or 3am.²]

I have explained the role of melatonin.¹

I have explained why Ms Parker was recommended to use melatonin.²

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

5. [Ms. Parker is not getting enough sleep required for her age.¹][This is because Ms Parker is 25 years old and therefore requires approximately 7.75 hours of sleep, which she is not getting as she is awake until 3am and has to wake up for work at 7am.²]

I have stated that Ms Parker is not getting the required sleep for her age.¹

I have justified this by outlining the sleep requirements for Ms Parker's age group.²

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

6. a. [A feature of REM sleep is that it is the stage of sleep where dreaming tends to occur.¹]

I have identified a feature of REM sleep.¹

Other acceptable answers include:

- the sleeper is virtually paralysed during REM sleep
- the brain is active in REM sleep
- sleepers can be woken fairly easily from REM sleep
- other features of REM sleep.

- b. [NREM stage 1 sleep is when we go from being awake to being asleep and is a light stage of sleep.¹][NREM stage 2 sleep is also a light stage of sleep and is the stage of sleep we spend the most time in.²][NREM 3 is the deepest stage of sleep and it is very difficult to wake individuals in this stage.³]

I have described stage 1 of NREM sleep.¹

I have described stage 2 of NREM sleep.²

I have described stage 3 of NREM sleep.³

7. a. [Sleep hygiene refers to the habits and practices used by an individual to promote sleep.¹]

I have described sleep hygiene.¹

- b. [Ms Parker does not have good sleep hygiene.¹][This is because the practices she implements do not promote sleep, such as drinking large amounts of coffee and eating large amounts of sugar directly before sleep, as well as using her laptop directly before sleep. These activities do not promote sleep, and rather promote wakefulness.²]

I have stated that Ms Parker does not have good sleep hygiene.¹

I have justified my response by referring to the case study and Ms Parker's sleep hygiene practices.²

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

- c. [Eating and drinking patterns, specifically what, when and how much food and drink is consumed by an individual, can act as a zeitgeber. Zeitgebers are external cues from the environment that influence the circadian rhythm.¹][In this way, Ms Parker could change her eating and drinking patterns to promote sleep by reducing her large sugar consumption before bed.²][Ms. Parker could do this by not consuming large amounts of lollies and ice cream late at night, as eating high-sugar foods and eating large amounts of food close to sleep has been shown to impair sleep quality and quantity.³]

I have discussed eating and drinking patterns as a zeitgeber.¹

I have discussed how Ms Parker could improve her sleep problem.²

I have discussed this in further detail, by discussing relevant examples from the scenario.³

I have referred to the character's name (Ms Parker) in my response, and to the scenario.

8. [Dr Sloane's diagnosis of advanced sleep phase syndrome is inaccurate.¹][Advanced sleep phase syndrome is a type of circadian rhythm sleep disorder in which sleep and waking occur earlier than usual and is common in older adults.²][Ms Parker's sleep patterns show that she is struggling to fall asleep and only falling asleep late at night, and waking up tired, this does not align with advanced sleep phase syndrome. Additionally, Ms Parker is a young adult so it is unlikely she has advanced sleep phase syndrome.³][Ms Parker's sleep patterns more accurately align with delayed sleep phase syndrome, a type of circadian rhythm sleep disorder in which sleep and waking occur later than usual.⁴]

I have stated that Dr Sloane's diagnosis of advanced sleep phase syndrome is inaccurate.¹

I have justified my response by explaining advanced sleep phase disorder.²

I have justified my response by analysing Ms Parker's sleep patterns.³

I have justified my response further by using my analysis of Ms Parker's sleep patterns to explain that Ms Parker has delayed sleep phase syndrome.⁴

I have referred to the characters' names (Dr Sloane and Ms Parker) in my response, and to the scenario.

Note: It is not correct to agree with Dr Sloane's diagnosis of advanced sleep phase disorder. Ms Parker's symptoms align with a diagnosis of delayed sleep phase syndrome.

Unit 4 AOS 1 review

SAC assessment 2

9. a. [Circadian rhythms are physiological and behavioural changes that occur as part of a cycle that lasts around 24 hours,¹] [whereas ultradian rhythms are physiological and behavioural changes that occur in a cycle that lasts less than 24 hours.²]
- I have briefly described circadian rhythms.¹
-
- I have briefly described ultradian rhythms.²
-
- I have used comparison words, such as 'whereas'.
-
- b. [A disruption to Ms Parker's ultradian rhythms could involve Ms Parker not progressing through the stages of REM and NREM sleep appropriately, such as not getting NREM stage 3 sleep.¹]
- I have suggested what a possible disruption to Ms Parker's ultradian rhythms would look like.¹
-
- I have referred to the character's name (Ms Parker) in my response, and to the scenario.
-

Other acceptable answers include:

- other disruptions to ultradian rhythms, such as not experiencing REM sleep.
10. a. [Bright light therapy is a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source.¹] [Ms Parker could use bright light therapy by exposing herself to bright light when she wakes up and limiting her exposure to bright light at nighttime.²] [This is because bright light acts as an external cue to the suprachiasmatic nucleus (SCN) which prompts the SCN to signal to the pineal gland when to release melatonin and/or cortisol, so when light is present melatonin is not released, therefore regulating Ms Parker's sleep-wake cycle.³]
- I have outlined bright light therapy.¹
-
- I have discussed how bright light therapy can improve Ms Parker's sleep problems.²
-
- I have discussed how bright light therapy influences the sleep-wake cycle and the suprachiasmatic nucleus.³
-
- I have referred to the character's name (Ms Parker) in my response, and to the scenario.
-
- b. [Dr Sloane should ensure that she exposes Ms Parker safely to the bright light source, which could involve not staring directly into the light source.¹]
- I have suggested what Dr Sloane should be careful about when treating Ms Parker with bright light therapy.¹
-
- I have referred to the characters' names (Dr Sloane and Ms Parker) in my response, and to the scenario.
-

Other acceptable answers include:

- the timing of the exposure
- the length of the exposure.

1. [It is hypothesised that people who wear blue light blocking glasses before sleep,¹] [are more likely to rate their sleep quality as better²] [than people who do not wear blue light blocking glasses before sleep.³]
- I have identified the independent variable.¹
-
- I have stated a direction (predicted effect of the IV on the DV) for my hypothesis.²
-
- I have identified the dependent variable.³
-
2. [This type of research design is mixed design.¹] [This research design combines elements of within-subjects designs, where participants complete multiple experimental conditions, and between-subjects designs, where participants are divided into different groups that complete different experimental conditions.²]
- I have identified the type of research design as a mixed design.¹
-
- I have described this type of research design.²
-
3. [The type of data is quantitative data.¹] [This is because quantitative data is expressed numerically, and the rating of sleep quality is numerical as it is on a scale from 1-10.²]
- I have identified the type of data as quantitative.¹
-
- I have described this type of data.²
-
- Other acceptable answers include:**
- identifying the data as subjective data.
4. [The results suggest that blue light blocking glasses are beneficial for sleep quality.¹] [This is because the control group who did not wear glasses did not improve their rating of sleep quality compared to,²] [the experimental group who did wear glasses and showed improvements in the sleep quality rating.³]
- I have provided a summary of the results.¹
-
- I have referred to the control group.²
-
- I have referred to the experimental group.³
-
5. [The control group did not change their rating of sleep quality based on the glasses they wore.¹] [This is because the glasses were not blue light blocking and therefore did not act as a zeitgeber and influence the sleep-wake cycle.²] [The experimental group's rating of sleep quality improved from without glasses to wearing blue light blocking glasses.³] [This is because the glasses blocked blue light which acts as a zeitgeber and can impact the sleep-wake cycle by signalling to the SCN and promoting wakefulness.⁴]

- I have described the results of the control group.¹

- I have explained why these results have occurred, with reference to zeitgebers and the sleep-wake cycle.²

- I have described the results of the experimental group.³

- I have explained why these results have occurred, with reference to zeitgebers and the sleep-wake cycle.⁴

6. [Sleep hygiene refers to the practices and habits that promote an individual's sleep patterns.¹][The results suggest that blue light blocking glasses are beneficial for better sleep quality.²][This may mean that people should follow advice on reducing blue light exposure before sleep as part of their sleep hygiene.³]

- I have explained sleep hygiene.¹

- I have explained the results obtained from the experiment.²

- I have explained how this may influence advice regarding sleep hygiene.³

7. [The experimenter may have included the week one condition to have baseline results for comparison.¹]

- I have suggested that the experimenter may have included the week one condition to have baseline results for comparison.¹

8. [A different measure that the experimenter could have used is an EEG.¹][An EEG is a device that detects, amplifies, and records the electrical activity of the brain.²]

- I have identified a different measure that the experimenter could have used instead of sleep diaries.¹

- I have described this measure.²

Other acceptable answers include:

- other measures of sleep, such as an EOG or EMG.

9. [Blue light can act as a zeitgeber.¹][Therefore, blue light signals to the suprachiasmatic nucleus (SCN) to cease melatonin production and promote wakefulness.²][In this way, reduced exposure to blue light through blue light blocking at night-time can promote better sleep quality by not signalling to the SCN to cease melatonin production.³]

- I have explained that blue can act as a zeitgeber.¹

- I have explained how blue light influences the SCN and sleep.²

- I have explained how blue light blocking will then influence the SCN and sleep.³

10. [An alternative influence on sleep that could replace blue light blocking glasses may be food consumption directly before sleep.¹][This would be useful because it is another example of a zeitgeber that can influence the sleep-wake cycle.²]

- I have suggested an alternative influence on sleep that could replace blue light blocking glasses in this experiment.¹

- I have explained why it would be useful to test this in an experiment.²

Other acceptable answers include:

- other zeitgebers, such as temperature.

11. [Similarly to blue light, caffeine can also act as a zeitgeber.¹][This means caffeine consumption can influence the sleep-wake cycle.²][Therefore, it is important for the researcher to control caffeine consumption as may act as an extraneous variable that can undesirably influence the results.³]

- I have explained that caffeine can act as a zeitgeber.¹

- I have explained how this influences the sleep-wake cycle.²

- I have explained why this means the experimenter has controlled caffeine consumption.³

12. [Prior knowledge about blue light blocking glasses may act as an extraneous variable.¹][Extraneous variables are any variable that is not the independent variable but may cause an unwanted effect on the dependent variable.²][Therefore, the experimenter may have discounted anyone from the study who had this prior knowledge in order to not influence the results.³]

- I have identified that known information about blue light blocking glasses may act as an extraneous variable.¹

- I have explained what extraneous variables are.²

- I have suggested why the experimenter may have done this.³

13. a. [Participants who rated their sleep as poor may be experiencing partial sleep deprivation.¹][Their affective functioning may be impaired, which may involve increased irritability and moodiness.²]

- I have suggested that participants who rated their sleep as poor may be experiencing partial sleep deprivation.¹

- I have described the likely state of their affective functioning.²

b. [People with a BAC of 0.05 have similar effects on functioning as people with 17 hours of sleep deprivation (partial sleep deprivation).¹][Therefore, people with a BAC of 0.05 and people who rated their sleep poorly are likely to experience impaired cognitive functioning, such as poor concentration.²]

- I have explained that a BAC of 0.05 is equivalent to 17 hours of sleep deprivation.¹

- I have explained that this means people who rated their sleep poorly and people with a BAC of 0.05 are likely to experience poor cognitive functioning.²

14. [A placebo is an inactive substance or treatment, such as a sugar pill.¹][The placebo effect is when participants respond to an inactive substance or treatment as a result of their expectations or beliefs.²]
[The placebo effect did not occur in this experiment because although the participants in the control group wore placebo glasses, they did not rate their sleep quality as improved.³]

- I have explained what a placebo is.¹

- I have explained the placebo effect.²

- I have explained that the placebo effect did not occur.³

15. [An issue with rating sleep quality on a scale is that it is subjective.¹]
[This means that the data is influenced by personal beliefs and ideas, so the changes in sleep quality rating due to blue light blocking glasses may be affected by the subjective nature of the scale.²]

- I have identified that an issue with rating sleep quality on a scale is that it is subjective.¹

- I have explained what this means and how it may affect the results.²

8A Ways of considering mental wellbeing

Theory review

1. I; II; III; IV. *High levels of functioning, resilience, and social and emotional wellbeing are all aspects of overall positive mental wellbeing.*
2. A. High levels of functioning involve people being able to complete everyday tasks in an independent and **effective** manner. *If individuals are able to complete everyday tasks effectively and independently, then they are likely experiencing high levels of functioning.*
3. B. False. *Resilience refers to the ability to adapt to change and uncertainty, not that a person does not experience stress.*
4. A. True. *The SEWB framework reflects two important concepts of wellbeing – that it is holistic and multidimensional.*
5. I; II; III; IV; VI; VII; VIII. *Access to services is not explicitly stated in the dimensions of the framework.*

Assessment skills

Perfect your phrasing

6. A 7. A

Compare and evaluate

8. C 9. B

Exam-style

Remember and understand

10. C 11. D

12. [In regards to social and emotional wellbeing, 'holistic' refers to an approach to wellbeing that considers the whole person, including their mental, physical, spiritual, and social needs.¹]

I have explained the term 'holistic' in relation to social and emotional wellbeing.¹

13. [High levels of functioning is a typical characteristic of mental wellbeing which involves being independent and able to carry out everyday tasks.¹][An individual can display high levels of functioning by being able to cook and shop for themselves.²][High levels of functioning is important for maintaining mental wellbeing as it allows an individual to meet their own needs independently, allowing them to feel confident in their abilities.³]

I have identified and explained one characteristic of mental wellbeing.¹

I have provided examples of this characteristic.²

I have explained why this characteristic is an important aspect of mental wellbeing.³

Other acceptable answers include:

- social wellbeing, and an appropriate example
- emotional wellbeing, and an appropriate example
- resilience, and an appropriate example.

Apply and analyse

14. A

15. [Firstly, the social and emotional wellbeing (SEWB) framework suggests that Aboriginal and Torres Strait Islander peoples view wellbeing holistically.¹][Secondly, the SEWB framework suggests that the wellbeing of an Aboriginal or Torres Strait Islander individual is intrinsically embedded within family, community, and extended kinship and nations.²][Thirdly, the SEWB framework suggests that there are a range of factors that influence Aboriginal and Torres Strait Islander peoples' social and emotional wellbeing, some of which include social, historical, political determinants.³]

I have outlined one example of what the SEWB framework suggests about Aboriginal and Torres Strait Islander wellbeing.¹

I have outlined another example of what the SEWB framework suggests about Aboriginal and Torres Strait Islander wellbeing.²

I have outlined a third example of what the SEWB framework suggests about Aboriginal and Torres Strait Islander wellbeing.³

16. [Jimmy is not experiencing high levels of functioning,¹][as seen through him finding it hard to cook for himself, and therefore not being able to independently carry out day-to-day tasks.²][Jimmy is also not displaying strong social and emotional wellbeing.³][This is seen through him not wanting to see his family or friends and being disrespectful towards his colleagues, which reveals he is not showing effective communication skills or maintaining positive relationships.⁴]

I have identified one characteristic of mental wellbeing.¹

I have provided examples from the scenario to demonstrate that Jimmy is not displaying this characteristic.²

I have identified another characteristic of mental wellbeing.³

I have provided examples from the scenario to demonstrate that Jimmy is not displaying this characteristic.⁴

I have referred to the character's name (Jimmy) in my response, and to the scenario.

Evaluate

17. [The SEWB framework includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples.¹][For example, dimensions such as connection to body, Country, and family are integral to overall wellbeing. If one of these dimensions is not fulfilled, it is possible that an individual's overall mental wellbeing will be impacted.²][Therefore, holistically considering and treating all aspects of mental, physical, spiritual, and social needs of Aboriginal and Torres Strait Islander peoples leads to better overall mental wellbeing.³]

- I have outlined the SEWB framework.¹

- I have identified that Aboriginal and Torres Strait Islander peoples wellbeing results from multiple dimensions.²

- I have used this information to justify why considering and treating social and emotional concerns from a holistic perspective leads to better mental wellbeing for Aboriginal and Torres Strait Islander peoples.³

Questions from multiple lessons

18. B 19. A

20. a. [Ingrid is exposed to the stressor of being a new mother.¹]
[This is an external stressor.²]

- I have identified a stressor within the scenario.¹

- I have identified that the stressor is external.²

- I have referred to the character's name (Ingrid) in my response, and to the scenario.

b. [Ingrid is most likely to be interpreting the stressor of a newborn baby as stressful and a threat during primary appraisal.¹][This is seen through Ingrid feeling as if she is incapable of looking after her daughter in the future, which has led to her losing sleep.²]

- I have identified Ingrid's primary appraisal as stressful, and more specifically as a threat.¹

- I have justified my response using a relevant example from the scenario.²

- I have referred to the character's name (Ingrid) in my response, and to the scenario.

Other acceptable answers include:

- Ingrid interpreting the stressor as a harm/loss, so long as justified with reference to the scenario.

c. [Ingrid is displaying low levels of mental wellbeing.¹][This is seen through Ingrid not displaying strong social and emotional wellbeing, such as refusing to accept support from her sister Jessica and responding angrily, showing that she is unable to appropriately control and express her emotions.²][Ingrid is also not displaying a high level of functioning, as she is relying on pre-packaged food even though she loves cooking, and is therefore unable to carry out day-to-day tasks independently.³]

- I have identified that Ingrid is displaying low levels of mental wellbeing.¹

- I have explained a characteristic of high levels of mental wellbeing that Ingrid is not displaying, using examples.²

- I have explained another characteristic of high levels of mental wellbeing that Ingrid is not displaying, using examples.³

- I have referred to the characters' names (Ingrid and Jessica) in my response, and to the scenario.

8B Mental wellbeing as a continuum

Theory review

1. A. True. *An individual's mental wellbeing is not static and will change depending on what is going on in their lives.*
2. A. Mental wellbeing is influenced by **internal and external factors**. *Stress and anxiety are examples of psychological constructs that reflect mental wellbeing, rather than being something that influences mental wellbeing.*
3. A. True. *Depending on severity and duration, stress and anxiety can be experienced by those with medium to high levels of mental wellbeing, whereas specific phobia is experienced by those with low levels of mental wellbeing.*

Assessment skills

Perfect your phrasing

4. A 5. B

Data analysis

6. D 7. C 8. B

Exam-style

Remember and understand

9. C 10. A

11. [Stress occurs when a person perceives they cannot cope with a current stressor, whereas anxiety occurs when a person perceives they cannot cope with a stressor that may occur in the future.¹]

- I have outlined one difference between stress and anxiety.¹

- I have used comparison words, such as 'whereas'.

Other acceptable answers include:

- stress can be both eustress and distress, whereas anxiety is only marked by distress.
12. [Internal factors arise from within the individual and contribute to their mental wellbeing,¹][an example of which is an individual's genetic predisposition,²][whereas external factors arise from the environment of an individual,³][an example of which is the loss of a significant relationship.⁴]

- I have explained internal factors.¹

- I have given an example of an internal factor.²

- I have explained external factors.³

- I have given an example of an external factor.⁴

- I have used comparison words, such as 'whereas'.

Apply and analyse

13. B 14. C

15. [The psychologist is likely to say that Renata is experiencing anxiety.¹] [This is because she is feeling uneasy, apprehensive, and worried, but not in response to a specific stressor.²]

I have identified that Renata is likely experiencing anxiety.¹

I have given a reason to justify my response.²

I have referred to the character's name (Renata) in my response, and to the scenario.

Questions from multiple lessons

16. D 17. A

18. a. [Ethan is likely to be characterised as having moderate to low mental wellbeing of the mental wellbeing continuum.¹] [This is due to him temporarily not optimally functioning, as seen through his inability to maintain positive relationships for the past two weeks.²]

I have identified that Ethan is most likely to be placed at moderate to low levels of mental wellbeing on the continuum.¹

I have justified my response by referring to examples from the scenario.²

I have referred to the character's name (Ethan) in my response, and to the scenario.

b. [Sleep deprivation is an internal factor that influences mental wellbeing.¹] [This is due to the side effects of poor sleep arising from within an individual, such as impaired cognition or mood.²]

I have identified that sleep deprivation is an internal factor.¹

I have justified my response, with reference to the factor arising from within the individual.²

Chapter 8 review

Multiple choice

1. C 2. B 3. C 4. A

5. B

Short answer

6. a. [The news of Ginger's grandmother is an external factor.¹]

I have identified that the news is an external factor.¹

I have referred to the character's name (Ginger's grandmother) in my response, and to the scenario.

b. [Ginger is most likely to be placed within the mentally healthy category along the mental health continuum.¹] [This is due to Ginger experiencing appropriate emotional reactions and seeking support from her family in a time of need.²]

I have identified that Ginger is likely mentally healthy.¹

I have justified my response by referring to examples of mentally healthy behaviour from the scenario, such as relying on social support.²

I have referred to the character's name (Ginger) in my response, and to the scenario.

Other acceptable answers include:

- mental health problem due to experiencing a temporary level of dysfunction and distress.

c. [Ginger is displaying social and emotional wellbeing.¹] [This is due to Ginger turning to her family for support, as well as expressing an appropriate emotional response of sadness when hearing the news of her grandmother having a stroke.²]

I have identified that Ginger is displaying social and emotional wellbeing.¹

I have provided examples of Ginger displaying social and emotional wellbeing.²

I have referred to the character's name (Ginger) in my response, and to the scenario.

7. [Levels of functioning refer to the degree to which an individual can complete day-to-day tasks in an independent and effective manner, which can therefore be used to understand whether someone is experiencing high levels of mental wellbeing.¹] [For example, a student who is able to wake up, shower, and attend their school classes and extracurricular activities is likely to have high levels of functioning, which can indicate high levels of mental wellbeing in turn.²] [Levels of resilience can be used to understanding mental wellbeing as it refers to the degree to which an individual can cope with and manage change and uncertainty, with someone being more likely to experience high levels of mental wellbeing if they are able to cope with change.³] [For example, a student who is able to seek out solutions when struggling with time management and be flexible in changing their routine is likely to have a high level of resilience.⁴]

I have described levels of functioning as a way to consider mental wellbeing.¹

I have used an example.²

I have described levels of resilience as a way to consider mental wellbeing.³

I have used an example.⁴

8. a. [Social wellbeing involves the ability for an individual to form and maintain meaningful bonds with others, and adapt to different social situations,¹] [whereas emotional wellbeing involves the ability for an individual to appropriately control and express their own emotions in an adaptive way, as well as to understand the emotions of others.²]

- I have described social wellbeing.¹

- I have described emotional wellbeing.²

- I have used comparison words, such as 'whereas'.

b. [The social and emotional wellbeing (SEWB) framework is a framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples.¹]

- I have described the social and emotional wellbeing framework.¹

c. [The social and emotional wellbeing framework is holistic, which means that it reflects an approach to wellbeing that considers the whole person, including their mental, physical, spiritual, and social needs.¹][It is also multidimensional, which means that it is made up of different components.²]

- I have described how the social and emotional wellbeing framework is holistic.¹

- I have described how the social and emotional wellbeing framework is multidimensional.²

9. [Levels of functioning refer to the degree to which an individual can complete day-to-day tasks in an independent and effective manner.¹][Stacey's level of functioning is likely to be low and this may involve her being unable to attend school and maintain her personal hygiene.²][Levels of resilience refer to the degree to which an individual can cope with and manage change and uncertainty.³][Stacey's level of resilience is likely to be low and this may involve her finding it difficult to cope with any changes in her workplace.⁴][Social wellbeing involves the ability for an individual to form and maintain meaningful bonds with others, and adapt to different social situations, while emotional wellbeing involves the ability for an individual to appropriately control and express their own emotions in an adaptive way, as well as to understand the emotions of others.⁵][Stacey's social and emotional wellbeing is likely to be low and this may involve her relationships with her friends and family weakening, and her reacting inappropriately in different scenarios, such as yelling at a customer at a work when she is upset.⁶]

- I have described levels of functioning as a way to consider mental wellbeing.¹

- I have suggested that Stacey's level of functioning is likely to be low.²

- I have described levels of resilience as a way to consider mental wellbeing.³

- I have suggested that Stacey's level of resilience is likely to be low.⁴

- I have described social and emotional wellbeing as a way to consider mental wellbeing.⁵

- I have suggested that Stacey's social and emotional wellbeing is likely to be low.⁶

- I have referred to the character's name (Stacey) in my response, and to the scenario.

10. [It is likely that Amelia was experiencing anxiety.¹][This is because she was shaking and very worried about crossing the bridge, but eventually was able to cross it, showing that her anxiety was not entirely maladaptive.²][On the other hand, Grace appeared to have a phobia of heights.³][This is evident in that her response, which was breaking down and being completely unable to cross the bridge, demonstrated that her fears are maladaptive and also disproportionate in relation to the bridge as it was safe to cross.⁴]

- I have identified that Amelia is experiencing anxiety.¹

- I have justified why Amelia is experiencing anxiety, using the scenario and a feature which is comparable to phobia and stress (amount of anxiety, adaptiveness of response).²

- I have identified that Grace is experiencing a phobia.³

- I have justified why Grace is experiencing a phobia, using the scenario and a feature which is comparable to anxiety and stress (amount of anxiety, maladaptiveness of response).⁴

- I have referred to the characters' names (Grace and Amelia) in my response, and to the scenario.

11. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students needed to explore how mental wellbeing is tracked and relate it to a VCE student in their final year of schooling. Discussion of the following would be awarded:

- The mental wellbeing continuum, including a discussion of high, medium, and low levels of mental wellbeing. For example, students could discuss how a VCE student's mental wellbeing may be tracked by and fluctuate across the continuum.

Students needed to explore how mental wellbeing is considered and relate it to a VCE student in their final year of schooling. Discussion of the following would be awarded:

- Levels of functioning.
- Levels of resilience.
- Social and emotional wellbeing, including the social and emotional wellbeing (SEWB) framework.
- For example, students could discuss how the considerations of mental wellbeing may be present and/or absent in a VCE student's life.

Students needed to explore how mental wellbeing is influenced and relate it to a VCE student in their final year of schooling. Discussion of the following would be awarded:

- Internal factors.
- External factors.
- For example, students could discuss stressors, such as exams, influencing a VCE student's mental wellbeing.

Students would also need to provide a description of mental wellbeing within their response. This question requires students to use their own examples of a VCE student to discuss mental wellbeing, in the absence of any stimulus material.

9A Specific phobia and its contributing factors

Theory review

- I; II; IV. *Biological, psychological, and social factors can contribute to the development of specific phobias.*
- B. False. *By contrast, an unhealthy level of the neurotransmitter GABA can contribute to the development of specific phobia.*
- A. An individual with a phobia will often **avoid** their phobic stimulus, which can **negatively** reinforce avoidance. *Specific phobias can be perpetuated through operant conditioning.*
- A. True. *Stigma around seeking treatment is a social factor that can contribute to the development of specific phobia.*

Assessment skills

Perfect your phrasing

5. B 6. A 7. A

Compare and evaluate

8. A 9. B 10. A

Exam-style

Remember and understand

11. B 12. B

13. [Operant conditioning has a perpetuating role in specific phobia.¹]
[This is because the consequence stage of operant conditioning can negatively reinforce avoidance behaviours to phobic stimuli that prevent someone from becoming anxious.²]

I have identified that operant conditioning has a perpetuating role.¹

I have explained how operant conditioning perpetuates specific phobia with reference to negative reinforcement.²

14. [Long-term potentiation involves the strengthening of connections between neurons that are repeatedly coactivated.¹][In terms of phobia development, this involves coactivation of the neural signals involving the perception of a phobic stimulus and of the neural signals in the stress response, which strengthens their association in memory and learning, contributing to a specific phobia.²]

I have described the process of long-term potentiation.¹

I have described how long-term potentiation contributes to the development of specific phobia.²

Apply and analyse

15. C 16. C

17. a. [If Carson has low levels of GABA, his inhibitory activation of neurons during the stress response might not be high enough.¹]
[This means there is an over-activation of neural pathways, causing anxiety and a phobic response as the fight-flight-freeze response is more easily triggered.²]

I have identified that GABA dysfunction means there is not enough inhibitory neural activation in the stress response.¹

I have explained that over-activation of neurons triggers the stress response (flight-fight-freeze response) which causes phobic anxiety.²

I have referred to the character's name (Carson) in my response, and to the scenario.

- b. [Carson may have had a specific environmental trigger that developed his phobia,¹][such as a traumatic experience in crowds, like being lost in one as a child.²]

I have identified a type of social contributing factor.¹

I have outlined how this social factor may have led Carson to fear crowds by identifying specific experience.²

I have referred to the character's name (Carson) in my response, and to the scenario.

18. [Flynn is showing a memory bias.¹][This has led Flynn to recall his experience with repeated hexagons as the most horrific experience he ever had, which strengthens his phobia of the patterns, as he associates them with a traumatic experience.²][Flynn also presents catastrophic thinking.³][He thinks that if he walks near a metal fence, he will have a public breakdown, which strengthens his phobic response in that the stimulus becomes associated with very bad consequences.⁴]

I have identified memory bias as a cognitive bias that Flynn is presenting.¹

I have explained how memory bias contributes to Flynn's phobia.²

I have identified catastrophic thinking as a cognitive bias that Flynn is presenting.³

I have explained how catastrophic thinking contributes to Flynn's phobia.⁴

I have referred to the character's name (Flynn) in my response, and to the scenario.

Questions from multiple lessons

19. A

20. a. [It is hypothesised that prolonged exposure to the phobic stimulus¹][will increase²][the likelihood of a phobic response being displayed in the population of young children.³]

- I have identified the independent variable.¹

- I have stated the direction of my hypothesis.²

- I have identified the dependent variable.³

b. [One ethical consideration that Maia did not take into account in her experiment is voluntary participation.¹] [Her participants were her younger siblings who did not choose to be a part of her study, and as such she has breached this ethical consideration.²]

- I have outlined one relevant ethical consideration for this scenario.¹

- I have outlined why this ethical consideration was not appropriately considered.²

- I have referred to the character's name (Maia) in my response, and to the scenario.

Other acceptable answers include:

- informed consent
- debriefing when deception is used
- withdrawal rights of the participant
- no harm principle
- confidentiality.

c. [Persistent and irrational fear of a specific stimulus.¹] [Avoidance of the phobic stimulus.²] [Fear of phobic stimulus affects daily functioning.³]

- I have outlined a characteristic of specific phobia.¹

- I have outlined another characteristic of specific phobia.²

- I have outlined a third characteristic of specific phobia.³

9B Evidence-based interventions for specific phobia

Theory review

1. A. True. *There are different ways that specific phobia can be managed. These include biological, psychological, and social evidence-based interventions.*
2. I; II; III. *Evidence-based interventions are described as biological, psychological, or social.*
3. I; II; IV. *Cognitive behavioural therapy, psychoeducation, and breathing retraining are all examples of evidence-based interventions for specific phobia, while avoidance therapy is not.*
4. A. GABA **agonists** can be used as a **biological** evidence-based intervention for specific phobia, as they help mimic the effects of **GABA**. *GABA dysfunction is a contributing factor to the development of specific phobia, therefore a drug that mimics GABA can act as a biological intervention.*
5. B. False. *Although specific phobia can be treated through social evidence-based interventions, it is not the best treatment option, rather, a combination of biological, psychological, and social interventions is preferred.*

Assessment skills

Perfect your phrasing

6. B 7. B 8. A

Compare and evaluate

9. B 10. A 11. A 12. B

Exam-style

Remember and understand

13. B
14. [Phobic anxiety involves fast-paced and often shallow breathing, sometimes causing hyperventilation and activation of other sympathetic nervous system responses.¹] [Breathing retraining involves teaching someone to control their breath and work on reducing fast-breathing through deep, slow breaths.²] [When someone has phobic anxiety, they can apply this technique to induce physiological relaxation to reduce phobic anxiety through parasympathetic responses.³]

I have explained that phobic anxiety often involves fast, uncontrolled breath, linking it sympathetic nervous system arousal.¹

I have explained how breathing retraining is taught.²

I have explained how applying breathing techniques can induce physiological relaxation and anxiety through parasympathetic responses.³

15. [Benzodiazepines work as an agonist for GABA by binding to the GABA receptor sites on neurons to mimic the effects of GABA,¹] [increasing the effectiveness of GABA,²] [thereby allowing GABA to have its inhibitory effects.³] [By making the neuron less likely to fire, the over-excitation of neurons that causes anxiety is reduced, providing a temporary relief of the stress response.⁴]

I have explained that benzodiazepines are GABA agonists that bind to GABA receptors by mimicking GABA.¹

I have explained that they increase the effectiveness of GABA.²

I have explained how GABA is then able to provide its inhibitory effect.³

I have linked the inhibitory effect of GABA to reducing the stress response.⁴

Apply and analyse

16. B 17. A

18. a. [Eliza should begin by learning relaxation techniques, such as breathing retraining.¹] [She should then develop a fear hierarchy, ranking experiences from least anxiety-inducing interactions with cats, to being in direct contact with a cat.²] [She should then, under the supervision of a professional, gradually work her way through this fear hierarchy, pairing fearful stimuli with relaxation techniques.³] [Eliza should continue this process until she is able to touch or be near a cat without producing the fear response.⁴]

- I have explained the step of learning a relaxation technique.¹

- I have explained the step of developing a fear hierarchy.²

- I have explained the step of gradual exposure along the fear hierarchy with the use of relaxation techniques.³

- I have explained that the systematic gradual exposure needs to be continued.⁴

- I have referred to the character's name (Eliza) in my response, and to the scenario.

b. [Eliza could also undergo cognitive behavioural therapy.¹] [This would first involve her identifying any unhelpful thoughts and behaviours she performs surrounding cats, for example, the belief that they are all evil and out to get her.²] [She would then attempt to substitute the unhealthy thoughts/behaviours with more healthy ones, for example, by challenging the belief that all cats are evil as a hypothesis rather than a fact and/or by implementing behavioural changes such as the use of breathing retraining.³]

- I have correctly identified that the other psychological intervention Eliza could use would be cognitive behavioural therapy.¹

- I have explained the stage of cognitive behavioural therapy involving identifying unhelpful thoughts and behaviours.²

- I have explained the stage of cognitive behavioural therapy involving replacing unhelpful thoughts and behaviours with more helpful ones with brief examples.³

- I have referred to the character's name (Eliza) in my response, and to the scenario.

Questions from multiple lessons

19. a. [Cognitive behavioural therapy is a form of psychotherapy which encourages individuals to substitute dysfunctional cognitions and behaviours with more healthy ones.¹] [In terms of cognition, Grayson could try change his thoughts and feelings around sleep and his phobia of germs by replacing his negative thoughts about germs when trying to fall asleep with more positive thoughts, such as reminding himself that the bed has been cleaned and he will be able to fall asleep.²] [In terms of behaviour, Grayson could try to not avoid germs in other areas of his life, such as sitting in public spaces, and he could develop a good sleep hygiene routine.³]

- I have described cognitive behavioural therapy.¹

- I have described how the cognitive component of cognitive behavioural therapy could be used by Grayson to improve his sleep and specific phobia.²

- I have described how the behavioural component of cognitive behavioural therapy could be used by Grayson to improve his sleep and specific phobia.³

- I have referred to the character's name (Grayson) in my response, and to the scenario.

b. [If Grayson is having trouble falling asleep, he may be not getting adequate quality and quantity of sleep and therefore may be experiencing partial sleep deprivation.¹] [This may impair his affective functioning, as he may become more irritable and easily upset, which may result in increased angry outbursts towards his roommate over minor issues. Therefore, Grayson's friendship with his roommate may be negatively impacted.²]

- I have described that Grayson's current sleep situation may lead to him experiencing partial sleep deprivation.¹

- I have described that if Grayson is experiencing partial sleep deprivation his friendship with his roommate may be negatively impacted due to impaired affective functioning.²

- I have referred to the character's name (Grayson) in my response, and to the scenario.

Chapter 9 review

Multiple choice

- | | | | |
|------|------|------|------|
| 1. B | 2. C | 3. A | 4. B |
| 5. A | 6. B | 7. A | 8. A |

Short answer

9. [A cognitive bias like catastrophic thinking¹] [psychologically contributes to specific phobias because when a person thinks about the worst-case scenario in regards to a certain stimulus, they come to associate it with fear.²]

- I have identified one psychological contributing factor.¹

- I have described how this factor psychologically contributes to specific phobias.²

Other acceptable answers include:

- precipitation by classical conditioning
- perpetuation by operant conditioning.

10. a. [A biological factor that could contribute to Dylan's phobia of fish is GABA dysfunction.¹] [GABA dysfunction is the insufficient neural transmission or reception of GABA, which is an inhibitory neurotransmitter.²] [For Dylan, his neurons may be less receptive to GABA which will reduce inhibitory neural impulses, therefore contributing to anxiety and potentially contributing to his phobia of fish.³]

- I have identified a biological factor that could contribute to Dylan's phobia.¹

- I have explained this factor.²

- I have linked this factor to Dylan's phobia.³

- I have referred to the character's name (Dylan) in my response, and to the scenario.

b. [Cognitive behavioural therapy would first involve Dylan identifying his unhealthy cognition of catastrophic thinking about fish.¹] [He would then need to try and replace these unhealthy thoughts,²] [perhaps by questioning whether his fears are just hypotheses rather than facts, and thinking about the likelihood of them happening.³]

I have outlined that cognitive behavioural therapy would first require identifying the unhealthy cognition of catastrophic thinking.¹

I have identified that these cognitions would need to be replaced.²

I have suggested a way Dylan could replace his unhealthy cognitions.³

I have referred to the character's name (Dylan) in my response, and to the scenario.

c. [Psychoeducation involves teaching families and supporters of individuals with mental disorders how to better understand, deal with, and treat their disorder.¹] [Dylan's family and friends could use psychoeducation to challenge Dylan's unrealistic or unwanted thoughts about fish, such as that they are suggesting to him that they are not dangerous.²] [His family and friends could also use psychoeducation to not encourage avoidance behaviours, meaning that they would try to not let Dylan avoid situations where he might encounter fish, such as going to the beach.³]

I have described psychoeducation.¹

I have suggested how Dylan's family and friends could help his phobia of fish by challenging unrealistic and unwanted thoughts.²

I have suggested how Dylan's family and friends could help his phobia of fish by not encouraging avoidance behaviours.³

I have referred to the character's name (Dylan) in my response, and to the scenario.

11. a. [Systematic desensitisation works to de-condition the association that produces the phobic response.¹] [For Coen, this is between the conditioned stimulus of the cat and the conditioned response of fear.²] [By using relaxation techniques in intervals after gradual exposure to a cat-related stimulus, cats over time will become associated with relaxation rather than fear.³]

I have briefly described how systematic desensitisation works in relation to classical conditioning.¹

I have described what the classically conditioned association is for Coen.²

I have explained how the processes in systematic desensitisation work to undo this association with the use of relaxation techniques and gradual exposure.³

I have used the language of classical conditioning, referring to the conditioned stimulus and conditioned response.

I have referred to the character's name (Coen) in my response, and to the scenario.

b. [Benzodiazepines are a type of medication that depresses central nervous system activity and is often used as a short-acting anti-anxiety medication.¹] [Coen could be prescribed a benzodiazepine to take when exposed to cats, as it will act as a GABA agonist and promote the inhibitory effect of GABA, therefore reducing arousal and anxiety.²]

I have described benzodiazepines.¹

I have described how Coen could use benzodiazepines to manage his phobia of cats.²

I have referred to the character's name (Coen) in my response, and to the scenario.

c. [Coen may have needed to overcome the stigma around seeking treatment.¹] [Stigma around seeking treatment is a social contributing factor to specific phobias and involves the sense of shame a person might feel about getting professional help for their phobia.²]

I have identified that Coen may have needed to overcome stigma around seeking treatment.¹

I have briefly outlined what stigma around seeking treatment is.²

I have referred to the character's name (Coen) in my response, and to the scenario.

12. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students would need to consider all relevant biological, psychological, and social factors contributing to specific phobia. Discussion of the following would be awarded:

- Biological contributing factors. In particular, long-term potentiation and GABA dysfunction.
- Psychological contributing factors. In particular, operant conditioning in relation to Seth's avoidance of his phobic stimulus.
- Social contributing factors. In particular, stigma around seeking treatment, as Seth perceives himself as 'weird' due to his phobia. Additionally, specific environmental triggers as Seth had an unpleasant experience when he was younger in relation to tattoos.

Students would need to consider all relevant biological, psychological, and social evidence-based interventions for specific phobia. Discussion of the following would be awarded:

- Biological evidence-based interventions. In particular, benzodiazepines as GABA agonists. This can be linked to GABA dysfunction as a biological contributing factor.
- Psychological evidence-based interventions. In particular, cognitive behavioural therapy and systematic desensitisation. For example, working with a therapist to recognise and change negative thoughts and behaviours around Seth's phobia.
- Social evidence-based interventions. In particular, psychoeducation for Seth's parents. For example, teaching Seth's parents to not encourage avoidance behaviours.

10A Biopsychosocial approach: Protective factors for mental wellbeing

Theory review

1. A. True. *Protective factors can help 'protect' an individual from lower levels of mental wellbeing.*
2. B. False. *The biopsychosocial model suggests that biological, psychological, and social influences are equally effective and best used together.*
3. I; II; III. *Adequate nutrition and hydration is a biological protective factor and support from family, friends, and community is a social protective factor.*
4. B. False. *Mindfulness meditation is an example of a psychological protective factor for mental wellbeing, but it does not guarantee that an individual will not experience poor mental wellbeing.*

Assessment skills

Data analysis

5. A 6. B 7. B 8. D
9. C

Exam-style

Remember and understand

10. B
11. [Protective factors for mental wellbeing are influences that enable an individual to promote and maintain high levels of mental wellbeing.¹]
 I have outlined what protective factors are.¹
12. [A psychological protective factor is the use of cognitive behavioural strategies.¹][An individual can use cognitive behavioural strategies to promote their mental wellbeing by acknowledging their dysfunctional thoughts and behaviours and then working to change them to become more beneficial for their life.²]
 I have identified a psychological protective factor.¹
 I have explained how this psychological protective factor can promote mental wellbeing.²

Apply and analyse

13. C

14. [Pim and his family could ensure that they all maintain adequate quality and quantity of sleep as this is linked to higher levels of mental wellbeing.¹][Pim and his family could also practice mindfulness meditation to help them manage this situation, as research shows that mindfulness meditation can promote mental wellbeing.²][Pim and his family could also access support from their friends, such as getting help cooking meals if Pim's family are busy looking after their grandfather, to help reduce their stress levels and promote mental wellbeing.³]

- I have discussed how Pim and his family could use a biological factor to maintain their mental wellbeing.¹
- I have discussed how Pim and his family could use a psychological factor to maintain their mental wellbeing.²
- I have discussed how Pim and his family could use a social factor to maintain their mental wellbeing.³
- I have referred to the character's name (Pim) in my response, and to the scenario.

Questions from multiple lessons

15. a [Athena is likely to be placed in the middle of the mental wellbeing continuum.¹][This is because she is experiencing some stress and anxiety but it is not major, therefore she is likely to have moderate levels of mental wellbeing.²]
 I have suggested where Athena is likely to be placed on the mental wellbeing continuum.¹
- I have explained why I have suggested this by referring to the case study.²
- I have referred to the character's name (Athena) in my response, and to the scenario.
- b. [Athena could have accessed support from family as a social protective factor for mental wellbeing.¹][Athena's family could have provided her with advice or assistance with how to take care of herself while preparing for her dance recital.²]
 I have identified a protective factor Athena could have used.¹
- I have explained this factor.²
- I have referred to the character's name (Athena) in my response, and to the scenario.
- c. [A psychological model that could reflect this situation is Selye's General Adaptation Syndrome (GAS) which is a biological model involving three stages (alarm reaction, resistance, and exhaustion) of physiological reactions that a person experiences in response to a persistent stressor.¹][Athena is likely to be in the resistance stage of the GAS which is why she got sick after the recital.²][This stage involves maintaining high levels of bodily arousal in response to a persistent stressor, which can lead to the depletion of bodily resources and immune system suppression. Therefore Athena's stress about her dance recital has led to her developing a cold.³]

- I have outlined Selye's General Adaptation Syndrome (GAS) as the psychological model that may explain why Athena got sick after her dance recital.¹

- I have suggested that Athena is likely to be in the resistance stage of GAS.²

- I have justified this suggestion by explaining what the resistance stage involves.³

- I have referred to the character's name (Athena) in my response, and to the scenario.

Note: It is not correct to say that Athena is in the exhaustion stage of the GAS as she has a cold rather than a severe illness. The experience of mild illness does not necessarily mean that a person is in the exhaustion stage.

10B Cultural determinants of wellbeing for Aboriginal and Torres Strait Islander peoples

Theory review

1. B. False. *Culture is considered to be an important determinant of wellbeing. It is one that encompasses a strong sense of identity, values, tradition, and connection between the past, present, and future, driving behaviour and beliefs.*
2. III; IV. *Cultural continuity and self-determination are two important cultural determinants of wellbeing.*
3. I; II; III. *Cultural continuity can be achieved in a variety of ways including arts and crafts, language, and theatre.*
4. A. *Community-controlled organisations are one way that self-determination can be enacted.*

Assessment skills

Perfect your phrasing

5. B 6. A

Text analysis

7. B 8. B 9. A 10. C

Exam-style

Remember and understand

11. B
12. [Determinants of wellbeing are factors that influence health and wellbeing on individual and community levels,¹] [such as culture.²]
 - I have explained what determinants of wellbeing are.¹

 - I have provided an example of a determinant of wellbeing.²

13. [It is important to consider cultural determinants have a significant impact on wellbeing for Aboriginal and Torres Strait Islander peoples.¹] [Further, they are unique to Aboriginal and Torres Strait Islander communities and context, and therefore may be somewhat different to other methods of maintaining mental wellbeing.²]

I have outlined that cultural determinants significantly impact the mental wellbeing of Aboriginal and Torres Strait Islander peoples.¹

I have outlined that they are unique considerations.²

Apply and analyse

14. B
15. [By passing down Indigenous art, which is an example of cultural continuity, an Indigenous person may be able to actively practise cultural knowledge and traditions, allowing for the maintenance of their wellbeing.¹] [Moreover, community-controlled organisations, which are an endeavour of self-determination, encourage the celebration of the Indigenous identity and enable the community to meet their own needs, allowing for the wellbeing of Aboriginal and Torres Strait Islander peoples to be maintained.²]

I have provided an example of a way that cultural continuity may maintain the wellbeing of Aboriginal and Torres Strait Islander peoples.¹

I have provided an example of a way that self-determination may maintain the wellbeing of Aboriginal and Torres Strait Islander peoples.²

Questions from multiple lessons

16. [Protective factors are influences that enable an individual to promote and maintain high levels of mental wellbeing.¹] [As cultural determinants, such as cultural continuity and self-determination, are factors that positively influence health and wellbeing for Aboriginal and Torres Strait Islander communities, they can be considered protective factors.²]

I have explained what is meant by protective factors.¹

I have explained how cultural determinants can be considered protective factors.²

17. a. [Cathy's fear of fire is excessive and disproportionate, indicating that it may be a specific phobia.¹]

I have described a quality of Cathy's fear that indicates a specific phobia of fire.¹

I have referred to the character's name (Cathy) in my response, and to the scenario.

b. [The psychological factor of catastrophic thinking contributes to Cathy's specific phobia.¹][This is because they predict the stimulus of fire to be far worse than it actually is by believing that they will get severely burnt.²]

I have identified a factor that contributes to Cathy's specific phobia of fire.¹

I have explained how the factor contributes to Cathy's specific phobia.²

I have referred to the character's name (Cathy) in my response, and to the scenario.

c. [Psychoeducation, which is a social intervention for specific phobia, can be used to support Cathy and her friends and family to understand her specific phobia and how to encourage Cathy to stop avoiding ceremonies.¹][Importantly, if this psychoeducation can be conducted by members of the community itself (self-determination), Cathy's family can support her in a culturally relevant way and thus improve her phobia symptoms.²]

I have outlined how psychoeducation can be used to treat Cathy's specific phobia.¹

I have demonstrated how self-determination can be used within psychoeducation.²

I have referred to the character's name in my response (Cathy), and to the scenario.

b. [Although each individual is different, Callie could share with her friends that she has tried to achieve cultural continuity by attending her arts and music program to strengthen connections to culture.¹][Callie could also share with her friends that she has become involved in other community-run organisations, which is a means of self-determination.²]

I have suggested advice Callie could give to her friends, with reference to cultural continuity as a cultural determinant of wellbeing.¹

I have suggested advice Callie could give to her friends, with reference to self-determination as a cultural determinant of wellbeing.²

I have referred to the character's name (Callie) in my response, and to the scenario.

7. a. [Social protective factor.¹]

I have identified the type of protective factor evident in the scenario as a social protective factor.¹

b. [The support Cloe receives from her friends can help maintain high levels of mental wellbeing if it is authentic and energising.¹][This may involve her friends providing distractions from difficult emotions, or assistance with self-care.²]

I have suggested that support needs to be authentic and energising to maintain high levels of mental wellbeing.¹

I have suggested what this may involve for Cloe.²

I have referred to the character's name (Cloe) in my response, and to the scenario.

c. [Cloe's belief is inaccurate.¹][Though support from friends is a social protective factor for mental wellbeing, which reduce the likelihood of her experiencing poor mental health and wellbeing,²][protective factors for mental wellbeing do not guarantee that Cloe will never experience poor mental wellbeing, making her belief inaccurate.³]

I have evaluated that Cloe's belief is inaccurate.¹

I have explained the source of Cloe's belief.²

I have justified my response.³

I have referred to the character's name (Cloe) in my response, and to the scenario.

d. [Cloe could use biological protective factors to maintain high levels of mental wellbeing, such as ensuring she consumes healthy foods and drinks, which will ensure she receives adequate nutrition and hydration.¹][Cloe could use psychological protective factors, such as practising cognitive behavioural strategies in her routine, which may involve recognising and replacing her dysfunctional thoughts, feelings, and behaviours with more functional ones.²][Cloe could continue to use the social protective factor of her friends' support by talking to them and catching up with them regularly, in order to maintain high levels of mental wellbeing.³]

Chapter 10 review

Multiple choice

1. B 2. A 3. C 4. D
5. D

Short answer

6. a. [Callie is likely to experience cultural continuity.¹][This is because she partakes in activities that enhance her understanding of her culture and feels connected to her Indigenous identity and community, which may have occurred through the passing down and active practice of cultural knowledge, traditions, and values from generation to generation.²][Callie is likely to experience self-determination.³][This is because her role in the community demonstrates her freely pursuing her economic, social, and cultural development without outside interference, such as through organising her own community program about music and art.⁴]

I have stated that Callie is likely to experience cultural continuity.¹

I have justified my response.²

I have stated that Callie is likely to experience self-determination.³

I have justified my response.⁴

I have referred to the character's name (Callie) in my response, and to the scenario.

I have discussed how Cloe could use biological protective factors to maintain high levels of mental wellbeing.¹

I have discussed how Cloe could use psychological protective factors to maintain high levels of mental wellbeing.²

I have discussed how Cloe could use social protective factors to maintain high levels of mental wellbeing.³

I have referred to the character's name (Cloe) in my response, and to the scenario.

8. [A determinant of wellbeing is cultural continuity.¹][Culture is important to Aboriginal and Torres Strait Islander peoples and can help them maintain high levels of wellbeing and by enabling communities to heal and form strong identities.²]

I have identified a specific determinant of wellbeing.¹

I have suggested how this determinant may help Aboriginal and Torres Strait Islander peoples maintain high levels of wellbeing.²

Other acceptable answers include:

- self-determination.

9. Students needed to display that they had a thorough understanding of the question by demonstrating:

- an effectively structured response in the form of a detailed and organised set of notes
- that all parts of the question had been addressed
- that psychological terminology had been used in their answer.

Students needed to discuss how the teachers could use biopsychosocial protective factors for mental wellbeing in their program. Discussion of the following would be awarded:

- Biological protective factors for the maintenance of mental wellbeing.
 - For example, students could include a discussion of how adequate nutrition and hydration could be incorporated into the program.
- Psychological protective factors for the maintenance of mental wellbeing.
 - For example, students could include a discussion of how mindfulness meditation could be taught in the program and practised by students.
- Social protective factors for the maintenance of mental wellbeing.
 - For example, students could include a discussion of how social support could be a useful tool in the program.

Students needed to discuss how the teachers could use cultural determinants of wellbeing in their program. Discussion of the following would be awarded:

- Culture and cultural continuity.
 - For example, students could include a discussion of how cultural continuity could be achieved in the program, such as through engaging with arts, crafts, music, dance, theatre, writing, storytelling, languages, and other cultural practices.

- Self-determination.
 - For example, students could include a discussion of how self-determination could be promoted through the program, enabling the students to freely pursue their development without interference.

Unit 4 AOS 2 review

SAC assessment 1

1. a. [This sentence captures levels of functioning,¹][which refers to the degree to which an individual can complete day-to-day tasks in an independent and effective manner.²]

I have outlined the aspect of wellbeing captured.¹

I have explained this aspect.²

- b. [This statement is not applicable on a population level!¹][For instance, an individual with certain disabilities may not be able to physically keep up with work and study in the same way that an able-bodied person could, but that does not mean that they do not have high levels of mental wellbeing.²][Furthermore, for Aboriginal and Torres Strait Islander peoples, mental wellbeing is often not conceptualised in regards to these aspects and instead, may be conceptualised in a more holistic way.³]

I have evaluated that this statement is not applicable on a population level.¹

I have justified my response with one example.²

I have justified my response with another example.³

- c. [This sentence relates to the influence of social factors or culture on the definition of mental wellbeing as different cultures may prioritise work and study to varying degrees.¹][Furthermore, the sentence applies to the influence of broader societal changes as the 'need' to keep up with these things is something that may not have previously been of importance within society.²]

I have related the sentence to one conceptualisation of mental wellbeing.¹

I have related the sentence to another conceptualisation of mental wellbeing.²

2. a. [The mental wellbeing continuum indicates that mental wellbeing is not stagnant, and can fluctuate depending on an individual's circumstance.¹][Resilience refers to the ability to cope with and manage change and uncertainty.²][Therefore, if an individual has a mental illness but has high levels of resilience, they may be able to cope with stressors that they face to change their position on the mental wellbeing continuum and maintain a high level of wellbeing.³]

I have explained what the mental wellbeing continuum indicates about mental wellbeing.¹

I have explained what is meant by resilience.²

I have justified the statement with reference to resilience and the mental wellbeing continuum.³

b. [To reach a high level of mental wellbeing, individuals with a specific phobia may engage in a biological evidence-based intervention, such as the use of GABA agonists.¹] [GABA agonists are drugs that mimic a neurotransmitter by binding to and activating the receptor site of a neuron, therefore reducing the phobic response and relieving anxiety.²] [Individuals with a specific phobia may also engage in a psychological evidence-based intervention, such as cognitive behavioural therapy (CBT).³] [CBT involves working with a therapist to address negative thoughts and behaviours and to replace them with more adaptive ones.⁴] [Finally, individuals with a specific phobia may engage in social evidence-based interventions, such as psychoeducation.⁵] [Psychoeducation for specific phobia involves teaching families and supporters of individuals with specific phobias how to better understand, deal with, and treat their disorder.⁶]

I have identified a biological evidence-based intervention for the treatment of specific phobias.¹

I have explained this intervention.²

I have identified a psychological evidence-based intervention for the treatment of specific phobias.³

I have explained this intervention.⁴

I have identified a social evidence-based intervention for the treatment of specific phobias.⁵

I have explained this intervention.⁶

3. a. [For Aboriginal and Torres Strait Islander peoples, culture may refer to a strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs.¹]

I have explained what culture may mean to Aboriginal and Torres Strait Islander peoples.¹

b. [One determinant of wellbeing is cultural continuity, which refers to the passing down and active practise of cultural knowledge, traditions, and values from generation to generation.¹] [Cultural continuity may contribute to mental wellbeing for Aboriginal and Torres Strait Islander peoples as it enables individuals and communities to form strong identities.²] [Another determinant of wellbeing is self-determination, which refers to the rights of all peoples to pursue freely their economic, social and cultural development without outside interference.³] [Self-determination may contribute to mental wellbeing for Aboriginal and Torres Strait Islander peoples as autonomy and independence are integral to the maintenance of mental wellbeing.⁴]

I have described one cultural determinant of wellbeing.¹

I have described how this cultural determinant of wellbeing contributes to mental wellbeing.²

I have described another cultural determinant of wellbeing.³

I have described how this cultural determinant of wellbeing contributes to mental wellbeing.⁴

c. [The external influence of community can contribute to the development and maintenance of a specific phobia due to the stigma around seeking treatment.¹] [Stigma leads to an individual feeling shame, and may prevent people from seeking help, causing their phobia to worsen or remain present for longer.²]

I have identified stigma as an influence on others.¹

I have explained how stigma may contribute to the development and maintenance of a specific phobia.²

4. a. [The suggestion of 'increasing your physical activity' is a biological protective factor,¹] [while 'being kind to yourself' is a psychological protective factor²] [and 'volunteering in the community' is a social protective factor.³]

With reference to media text 1, I have outlined one biological protective factor.¹

With reference to media text 1, I have outlined one psychological protective factor.²

With reference to media text 1, I have outlined one social protective factor.³

b. [Internal factors are factors that arise from within the individual,¹] [whereas, external factors are factors that arise from an individual's environment.²] [An internal factor from media text 1 would be 'being kind to yourself'.³] [whereas, an external factor would be 'joining a club'.⁴]

I have described internal factors.¹

I have described external factors.²

I have provided an example of an internal factor from media text 1.³

I have provided an example of an external factor from media text 1.⁴

I have used comparison words, such as 'whereas'.

c. [Following the suggestions from media text 1 may contribute to higher levels of mental wellbeing as they address all aspects of the biopsychosocial framework.¹] [In addition, the suggestions provided are all protective factors for mental wellbeing.²] [However, these suggestions do not fully account for the experiences of mental wellbeing for Aboriginal and Torres Strait Islander peoples, such as through the consideration of Culture and Spirit.³] [Further, protective factors do not guarantee high levels of mental wellbeing and do not function as treatments for low levels of mental wellbeing.⁴] [Therefore, these suggestions would not guarantee high levels of mental wellbeing.⁵]

I have discussed a benefit of the suggestions.¹

I have discussed another benefit of the suggestions.²

I have discussed a limitation of the suggestions.³

I have discussed another negative of the suggestions.⁴

I have made a concluding statement.⁵

5. a. [The suggestion of 'eating a well-balanced diet' is applicable to the SEWB dimension of Connection to Body.¹][The suggestion of 'volunteering in the community' is applicable to the SEWB dimension of Connection to Community.²][The suggestion of 'expressing yourself through artistic mediums' is applicable to the SEWB dimension of Connection to Mind and Emotions.³]

I have related one example from media text 1 to a dimension of the SEWB framework.¹

I have related another example from media text 1 to a dimension of the SEWB framework.²

I have related another example from media text 1 to a dimension of the SEWB framework.³

- b. [The biopsychosocial model, SEWB framework and the media texts are multidimensional, meaning that they consider many different components.¹]

I have identified a similarity between both media texts, the SEWB framework, and the biopsychosocial model.¹

6. a. [This sentence connects to the SEWB framework dimension of Connection to Body which involves connecting to the physical body and health in order to participate fully in all aspects of life.¹]

I have explained how the sentence relates to the SEWB framework.¹

- b. [The aspect of Connection to Country, which refers to the traditional lands of a particular language or cultural group, both geographically and the spiritual, emotional and intellectual connections to and within it, was not discussed in either text 1 or text 2.¹]

I have described one aspect of mental wellbeing for Aboriginal and Torres Strait Islander peoples that is not discussed in either text 1 or text 2.¹

Other acceptable answers include:

- description of Connection to Spirituality and Ancestors.
- description of Connection to Family and Kinship.

Unit 4 AOS 2 review

SAC assessment 2

1. [The graph shows that questionnaire 2 differed the most from the self-report scale,¹][having a mean difference of 14.²][The graph also shows that questionnaire 3 differed the least,³][with a mean difference of 8.⁴]

I have stated one finding from the graph.¹

I have supported the statement with data.²

I have stated another finding from the graph.³

I have supported the statement with data.⁴

2. a. [This question reflects the concept of levels of functioning.¹]

I have identified the feature of high wellbeing that the question reflects.¹

- b. [In general, high levels of mental wellbeing can be characterised by high levels of social and emotional wellbeing.¹]

I have outlined a general characterisation of high mental wellbeing.¹

Other acceptable answers include:

- explanation of mental wellbeing as being characterised by high levels of resilience.
- c. [One internal factor that may prevent an individual from being able to independently complete tasks is the experience of negative thought patterns, such as having low self-efficacy.¹][Whereas, an external factor may be a lack of access to support services for an individual's mental or physical health.²]

I have identified an internal factor that may prevent an individual from being able to independently complete tasks.¹

I have identified an external factor that may prevent an individual from being able to independently complete tasks.²

3. a. [The biopsychosocial model suggests that in order to achieve mental wellbeing, biological factors (such as nutrition) need to be considered alongside psychological and social factors.¹][Similarly, the SEWB framework suggests that 'Connection to Body' is an important part of wellbeing, which describes connecting to the physical body and health, such as through one's diet.²][Therefore, this question is likely included in questionnaire 3 in an attempt to address mental wellbeing in a multidimensional way, which aligns with other aforementioned conceptualisations.³]

I have related the question to the biopsychosocial model.¹

I have related the question to the SEWB framework.²

I have made a concluding suggestion about the question's inclusion.³

- b. [Questionnaire 3 also considers psychological factors,¹][for example, 'how often do you make an effort to think positive thoughts?'.²][It also considers social factors,³][for example, 'How often do you feel supported by those around you?'.⁴]

I have outlined a biopsychosocial factor.¹

I have provided an example of this factor.²

I have outlined another biopsychosocial factor.³

I have provided an example of this factor.⁴

4. a. [A specific phobia is a type of anxiety disorder that is categorised by excessive and disproportionate fear when encountering a particular stimulus.¹]

I have explained what is meant by the term 'specific phobia'.¹

b. [An individual may use a psychological intervention to manage their symptoms, such as systematic desensitisation, which involves a patient being exposed incrementally to increasingly anxiety-inducing stimuli, combined with the use of relaxation techniques.¹] [In comparison, an individual may choose to use a biological intervention such as breathing retraining, which is a method used to teach breathing control techniques that may reduce physiological arousal.²]

I have outlined how an individual may use psychological interventions to manage these symptoms.¹

I have outlined how an individual may use biological interventions to manage these symptoms.²

I have used comparison words such as, 'In comparison'.

Other acceptable answers include:

- other psychological interventions for specific phobias, such as psychotherapeutic treatments or cognitive behavioural therapy.
- other biological interventions for specific phobias, such as the use of GABA agonists.

c. [One biological contributing factor to the student's specific phobia may be GABA dysfunction,¹] [a psychological contributing factor may be catastrophic thinking,²] [and a social contributing factor may be stigma around seeking treatment.³]

I have outlined a biological contributing factor specific phobias.¹

I have outlined a psychological contributing factor for specific phobias.²

I have outlined a social contributing factor for specific phobias.³

Other acceptable answers include:

- other biological contributing factors, such as long-term potentiation.
- other psychological contributing factors, such as classical conditioning (precipitating factors), operant conditioning (perpetuating factors), or other cognitive biases (such as memory bias).
- other social contributing factors, such as specific environmental triggers.

5. a. [Validity refers to the extent to which psychological tools, findings and investigations truly support their findings or conclusions.¹] [Whereas, reproducibility is the closeness of the agreement between the results of measurements of the same quantity being measured, carried out under changed conditions of measurement.²]

I have explained what is meant by validity.¹

I have explained what is meant by reproducibility.²

b. [Questionnaire 1 considers multiple aspects of mental wellbeing, such as aspects of the biopsychosocial model and the consideration of levels of functioning.¹] [However, the questionnaire reduces these aspects of mental wellbeing into specific items, such as performing in 'school' and 'work' or 'exercising'. Therefore it fails to account for the experience of individuals with illnesses or disabilities, and other cultures, such as Aboriginal and Torres Strait Islander peoples.²] [It is unlikely that internal validity is met as mental wellbeing is too complex to be accurately measured by these specific items.³] [Questionnaire 2 focuses on questions relating to specific phobias, which is a mental health condition that has the potential to significantly reduce an individual's mental wellbeing.⁴] [However, individuals without a specific phobia can still experience low levels of mental wellbeing, and individuals with a specific phobia are still able to experience high levels of mental wellbeing.⁵] [Therefore, questionnaire 2 lacks internal validity as it measures the presence of a specific phobia rather than an individual's mental wellbeing.⁶] [Questionnaire 3 asks questions regarding protective factors, which when present, often help to increase an individual's mental wellbeing.⁷] [However, protective factors do not guarantee high levels of mental wellbeing and an individual may experience low levels of mental wellbeing even in the presence of protective factors.⁸] [Therefore, questionnaire 3 does not have internal validity as measuring protective factors is not directly indicative of an individual's mental wellbeing.⁹]

I have discussed the internal validity of questionnaire 1 with reference to a positive.¹

I have discussed the internal validity of questionnaire 1 with reference to a negative.²

I have made a concluding statement regarding the internal validity of questionnaire 1.³

I have discussed the internal validity of questionnaire 2 with reference to a positive.⁴

I have discussed the internal validity of questionnaire 2 with reference to a negative.⁵

I have made a concluding statement regarding the internal validity of questionnaire 2.⁶

I have discussed the internal validity of questionnaire 3 with reference to a positive.⁷

I have discussed the internal validity of questionnaire 3 with reference to a negative.⁸

I have made a concluding statement regarding the internal validity of questionnaire 3.⁹

6. a. [A measure being applicable to all students means that the results of Dr Moses' sample would be generalisable to the population.¹][Methodological issues that may interfere with this include Dr Moses' small sample size of 30,²][and his sampling method of convenience sampling.³]

I have explained what is meant by a measure being 'applicable to all students'.¹

I have outlined one related methodological issue.²

I have outlined another related methodological issue.³

I have referred to the character's name in my response (Dr Moses), and to the scenario.

b. [Conceptualisations of mental wellbeing can include the SEWB framework and the biopsychosocial model, and they share some similar qualities, such as being multidimensional and holistic.¹][However, there are differences between these conceptualisations, such as that Aboriginal and Torres Strait Islander peoples may conceptualise mental wellbeing in reference to different factors, such as Connection to Country, which are not considered in other cultures.²][Having one measure for mental wellbeing would allow for simple comparisons to be made between individuals and groups.³][However, there are many factors that can impact what mental wellbeing means to an individual, and it is not reasonable to expect that all individuals experience and conceptualise mental wellbeing in the same way.⁴][Therefore, it is likely that it is not appropriate for all students' mental wellbeing to be measured on a singular scale.⁵]

I have discussed the similarities of mental wellbeing conceptualisations.¹

I have discussed the differences of mental wellbeing conceptualisations.²

I have discussed the benefits of using a singular measure.³

I have discussed the weaknesses of using a singular measure.⁴

I have made a concluding statement.⁵

GLOSSARY

A

Accuracy how close a measurement is to the true value of the quantity being measure p. 59

Acronym a mnemonic device in which the first letters of items form a pronounceable word to aid memory p. 261

Acrostic a mnemonic device in which the first letters of items create a phrase, rhyme, or poem to aid memory p. 262

Action potential an electrical impulse that travels down the axon of a neuron p. 110

Acute stress a form of stress characterised by intense psychological and physiological symptoms that are brief in duration p. 138

Adequate nutrition and hydration when the type and amount of food and drink that an individual consumes meet their physical needs p. 405

Advanced sleep phase disorder (ASPD) a type of circadian rhythm sleep disorder in which sleep and waking occur earlier than usual p. 327

Affective effects (relating to sleep deprivation) the changes in emotions and emotional responses that arise from sleep deprivation p. 319

After conditioning the third stage of classical conditioning, during which the neutral stimulus becomes the conditioned stimulus, producing a conditioned response p. 194

Agonists a type of drug that imitates neurotransmitters and works to initiate a neural response (excitatory or inhibitory) when it binds to the receptor sites of a neuron p. 389

Aim a statement outlining the purpose of an investigation p. 6

Alarm reaction the first stage of the General Adaptation Syndrome involving the initial decrease and subsequent increase in bodily arousal in response to an immediate stressor p. 145

Allocation the process of assigning participants to experimental conditions p. 32

Altered state of consciousness (ASC) a state of consciousness that is distinctly different from normal waking consciousness in terms of quality of experience and levels of awareness p. 282

Alzheimer's disease a neurodegenerative disease that involves the progressive loss of neurons in the brain and is characterised by memory decline p. 252

Amygdala (in relation to memory) a brain structure that is primarily involved in encoding the emotional components of memories p. 244

Amyloid plaques fragments of the protein beta-amyloid that accumulate into insoluble plaques that inhibit communication between neurons p. 253

Ancestors (in relation to SEWB) a belief that a family and community's ancestors are interconnected with Creation spirits and Country and watch over, guide, and protect families and communities in the physical and spiritual world p. 357

Antecedent the stimulus or event that precedes and often elicits a particular behaviour p. 201

Anxiety a psychological and physiological response that involves feelings of worry and apprehension about a perceived threat p. 367

Aphantasia a phenomenon in which individuals lack the capacity to generate mental imagery p. 254

Appraisal an assessment or evaluation of stimuli p. 155

Approach strategies coping strategies that directly confront the source of the stress p. 174

Atkinson-Shiffrin multi-store model of memory a model of memory which outlines the three separate stores of memory (sensory, short-term, and long-term) each of which interact through the processes of encoding, storage, and retrieval p. 232

Attention (in relation to observational learning) the first stage of observational learning in which individuals actively focus on the model's behaviour and the consequences of the behaviour p. 210

Autobiographical events personally lived experiences p. 250

Autonomic nervous system a division of the peripheral nervous system that regulates visceral muscles, organs, and glands, and transmits neural messages to the central nervous system about their activity p. 92

Avoidance strategies coping strategies that evade the stressor, seeking to indirectly reduce stress p. 175

Axon terminal (also known as terminal button) the end of a neuron that releases neurochemicals into the neural synapse p. 107

B

Bar chart a graph displaying the relationship between at least two variables using rectangular bars with heights or lengths proportional to the values they represent p. 52

Basal ganglia (in relation to memory) is a brain structure that is involved in encoding and storing procedural memories and classically conditioned memories that are associated with unconscious habits, behaviours, or procedures p. 244

Before conditioning the first stage of classical conditioning, during which the neutral stimulus has no associations and therefore does not produce any significant response p. 193

Behaviour (in relation to operant conditioning) the voluntary actions that occur in the presence of the antecedent p. 201

Behavioural effects (relating to sleep deprivation) the changes in actions and the ability to control them that arise from sleep deprivation p. 319

Behaviourist approaches to learning theories that propose learning occurs by interacting with the external environment p. 192

Beneficence the commitment to maximising benefits and minimising the risks and harms involved in taking a particular position or course of action p. 70

Benign-positive an initial appraisal of a stimulus as neutral or good that does not cause stress for the individual p. 156

Benzodiazepines a type of medication that depresses central nervous system activity and is often used as a short-acting anti-anxiety medication p. 389

Between-subjects design (also known as independent-groups design or between-groups design) an experimental design in which individuals are divided into different groups and complete only one experimental condition p. 21

Biological factors internal, genetic, and/or physiologically based factors p. 380

Biological protective factors (in relation to mental wellbeing) influences that stem from an individual's brain and/or body that can maintain or promote mental wellbeing p. 405

Biological rhythms repeated biological processes that are regulated by internal mechanisms p. 298

Biopsychosocial approach a holistic, interdisciplinary framework for understanding the human experience in terms of the influence of biological, psychological, and social factors p. 380

Blood alcohol concentration (BAC) a measure of how much alcohol is in a person's bloodstream p. 320

Blue light (in relation to zeitgebers) a type of light that can be emitted both naturally and artificially p. 336

Body (in relation to SEWB) connecting to the physical body and health in order to participate fully in all aspects of life p. 356

Brain a complex organ contained within the skull that coordinates mental processes and behaviour, and regulates bodily activity p. 91

Breathing retraining a method used to teach breathing control techniques that may reduce physiological arousal p. 390

Bright light therapy a method used to adjust a person's circadian rhythm through exposure to a high-intensity light source p. 328

C

Case study an in-depth investigation of an individual, group, or particular phenomenon (activity, behaviour, event, or problem) that contains a real or hypothetical situation and includes the complexities that would be encountered in the real world p. 15

Catastrophic thinking a type of cognitive bias in which a stimulus or event is predicted to be far worse than it actually is p. 384

Central nervous system a major division of the nervous system comprising the brain and spinal cord, which receives neural messages from and transmits neural messages to the peripheral nervous system p. 90, 164

Cerebellum (in relation to memory) a brain structure that encodes and stores implicit procedural memories p. 245

Challenge a further appraisal of a stressor as potentially providing a positive opportunity for growth or change for the individual p. 156

Chronic stress a form of stress that endures for several months or longer p. 139

Circadian rhythm sleep disorders sleep disorders that interfere with the typical regulation of the circadian rhythm of sleep, leading to a change in the sleep-wake cycle p. 326

Circadian rhythms biological and behavioural changes that occur as part of a cycle that lasts around 24 hours p. 298

Classical conditioning a process of learning through the involuntary association between a neutral stimulus and an unconditioned stimulus that results in a conditioned response p. 193

Classically conditioned memory a type of implicit memory that involves an involuntary response, such as fear, to a stimulus which has repeatedly been associated with an emotionally-arousing stimulus p. 243

Classification the arrangement of phenomena, objects, or events into manageable sets p. 17

Cognitive behavioural strategies techniques that utilise traits of cognitive behavioural therapy, particularly recognising and changing dysfunctional thought and behavioural patterns p. 407

Cognitive behavioural therapy (CBT) a form of psychotherapy that encourages individuals to substitute dysfunctional cognitions and behaviours with more adaptive ones p. 391

Cognitive bias a predisposition to think about and process information in a certain way p. 383

Cognitive effects (relating to sleep deprivation) the changes in mental processes that arise from sleep deprivation p. 320

Community (in relation to SEWB) connection to wider social systems, providing individuals and families the ability to connect with and support each other p. 356

Conclusion a statement that summarises the findings of a study, including whether the hypothesis was supported or rejected p. 63

Conditioned response the response that occurs involuntarily after the conditioned stimulus is presented p. 194

Conditioned stimulus the stimulus (originally the neutral stimulus) that produces a conditioned response after being repeatedly paired with an unconditioned stimulus p. 194

Confidentiality the privacy, protection and security of a participant's personal information in terms of personal details and the anonymity of individual results, including the removal of identifying elements p. 72

Confounding variable a variable that has directly and systematically affected the dependent variable, apart from the independent variable p. 37

Conscious response a deliberate and voluntary action that is initiated by the brain and performed intentionally by the body p. 98

Consciousness the level of awareness an individual has of their thoughts, feelings, perceptions, and existence p. 282

Consciousness continuum a visual representation of the different states of consciousness that progress from lower levels of awareness to higher levels of awareness p. 283

Consequence the outcome of the behaviour, which determines the likelihood that it will occur again p. 201

Context-specific effectiveness when the coping strategy or mechanism used is appropriate for the unique demands of the stressor p. 173

Control group the group of participants in an experiment who receive no experimental treatment or intervention in order to serve as a baseline for comparison p. 20

Controlled experiment a type of investigation in which the causal relationship between two variables is tested in a controlled environment; more specifically, the effect of the independent variable on the dependent variable while aiming to control all other variables p. 7

Controlled variables variables other than the IV that a researcher holds constant (controls) in an investigation, to ensure that changes in the DV are solely due to changes in the IV p. 8

Convenience sampling any sampling technique that involves selecting readily available members of the population, rather than using a random or systematic approach p. 30

Coping the process of dealing with a stressor p. 157, 172

Coping flexibility an individual's ability to adjust or change their coping strategies depending on the unique and changing demands of a stressor p. 174

Correlational study a type of non-experimental study in which researchers observe and measure the relationship between two or more variables without any active control or manipulation of them p. 15

Cortisol a hormone that is released in times of stress to aid the body in initiating and maintaining heightened arousal p. 139, 301

Counter shock the second substage of the alarm reaction stage in which sympathetic nervous system responses occur that mobilise the body to respond to the stressor p. 146

Counterbalancing a method to reduce order effects that involves ordering experimental conditions in a certain way p. 40

Country (in relation to Aboriginal and Torres Strait Islander cultures) traditional lands of a particular language or cultural group, including both geographical boundaries and the spiritual, emotional, and intellectual connections to and within it p. 218, 357

Cultural continuity the passing down and active practice of cultural knowledge, traditions, and values from generation to generation p. 414

Culture (in relation to SEWB) a strong sense of identity, values, tradition, and connection between the past, present, and future that drives behaviour and beliefs p. 356, 413

D

Data information used as part of or generated by an investigation p. 46

Daylight (in relation to zeitgebers) the typical light an individual is exposed to during the day, and is mostly natural blue light p. 336

Debriefing a procedure that ensures that, at the end of the experiment, the participant leaves understanding the experimental aim, results and conclusions p. 72

Deception the act of intentionally misleading participants about the true nature of a study or procedure p. 72

Delayed sleep phase syndrome (DSPS) a type of circadian rhythm sleep disorder in which sleep and waking occur later than usual p. 327

Demand characteristics cues in an experiment that may signal to a participant the intention of the study and influence their behaviour p. 39

Dendrite a branched extension of a neuron on which receptor sites are located p. 108

Dependent variable (DV) the variable the researcher measures in an experiment for changes it may experience due to the effect of the independent variable p. 7

Descriptive statistics statistics that summarise, organise, and describe data p. 48

Determinants of wellbeing factors that influence wellbeing on individual and community levels p. 413

Distress a form of stress characterised by a negative psychological state p. 137

Dopamine a neuromodulator primarily responsible for voluntary motor movement, the experience of pleasure, and reward-based learning p. 112

Double-blind procedure a procedure in which both participants and the experimenter do not know which conditions or groups participants are allocated to p. 41

During conditioning the second stage of classical conditioning, during which the neutral stimulus is repeatedly paired with the unconditioned stimulus, producing the unconditioned response p. 194

E

Eating and drinking patterns (in relation to zeitgebers)

what, when, and how much food and drink is consumed by an individual p. 337

Electroencephalograph (EEG) a device that detects, amplifies, and records the electrical activity of the brain p. 290

Electro-oculograph (EOG) a device that detects, amplifies, and records the electrical activity of the muscles responsible for eye movement p. 292

Electromyograph (EMG) a device that detects, amplifies, and records the electrical activity of the body's muscles p. 292

Emotion-focused coping the use of coping strategies that target the emotional components of a stressor, dealing with it indirectly rather than confronting its source p. 157

Emotional wellbeing the ability for an individual to appropriately control and express their own emotions in an adaptive way, as well as understand the emotions of others p. 354

Empirical evidence information obtained through direct and systematic observation or experimentation p. 3

Encoding the process of converting information into a useable form which can be manipulated and stored in the brain p. 233

Enteric nervous system the network of nerves in the gut and is a subdivision of the autonomic nervous system p. 164

Episodic memory a type of explicit memory that consists of personal experiences or events p. 242, 250

Ethical concepts the broad, moral guiding principles that people should consider when conducting research, practising psychology, or when analysing a psychological issue or debate p. 70

Ethical guidelines (also known as participants' rights)

the procedures and principles used to ensure that participants are safe and respected p. 71

Eustress a form of stress characterised by a positive psychological state p. 137

Excitatory effect when the neurotransmitter increases the likelihood of the postsynaptic neuron firing an action potential p. 110

Exhaustion the third stage of the General Adaptation Syndrome involving the depletion of energy levels and bodily resources, resulting in an inability to cope with the stressor p. 147

Experimental group the group of participants in an experiment who are exposed to a manipulated independent variable (i.e. a specific intervention) p. 20

Experimenter effect (also known as experimenter bias) when the expectations of the researcher affects the results of an experiment p. 39

Explicit memory (also known as declarative memory) a type of long-term memory that is consciously retrieved p. 242

External factors factors that arise from an individual's environment p. 365

External stressor a stimulus from outside of a person's body that prompts the stress response p. 135

External validity the extent to which the results of an investigation can be applied to similar individuals in different settings p. 62

Extraneous variable any variable that is not the independent variable but may cause an unwanted effect on the dependent variable p. 37

F

Family and kinship (in relation to SEWB) connection to the immediate and wider family group and community p. 356

Fieldwork any research involving observation and interaction with people and environments in real-world settings, conducted beyond the laboratory p. 17

Full sleep deprivation when an individual has no sleep within a 24-hour-period p. 318

G

GABA (gamma-aminobutyric acid) the main inhibitory neurotransmitter in the nervous system p. 110, 381

GABA dysfunction insufficient neural transmission or reception of GABA in the body p. 381

General Adaptation Syndrome (GAS) a biological model involving three stages of physiological reactions that a person experiences in response to a persistent stressor p. 145

Generalisable (also known as generalisability) the ability for a sample's results to be used to make conclusions about the wider research population p. 29

Glutamate the main excitatory neurotransmitter in the nervous system p. 110

Gut (also known as the gastrointestinal tract) the long flexible tube from mouth to anus that is the passageway involved in digestion p. 163

Gut microbiome all of the genes of the microorganisms that live in the gut p. 164

Gut microbiota all of the microorganisms that live in the gut p. 164

Gut-brain axis the bidirectional connection between the gut and the brain through the enteric and central nervous systems p. 164

H

Harm/loss a further appraisal of a stressor as having caused some damage to the individual p. 156

Hippocampus (in relation to memory) a brain structure that is primarily involved in encoding explicit memories p. 244

Holistic (in relation to SEWB) an approach to wellbeing that considers the whole person, including their mental, physical, spiritual, and social needs p. 355

Hypothesis a testable prediction about the outcome of an investigation p. 6

I

Identification a process of recognition of phenomena as belonging to particular sets or possibly being part of a new or unique set p. 17

Implicit memory a type of long-term memory that is unconsciously retrieved p. 242

Independent variable (IV) the variable for which quantities are manipulated (controlled, selected, or changed) by the researcher, and the variable that is assumed to have a direct effect on the dependent variable p. 7

Induced altered states of consciousness a type of altered state of consciousness that occurs due to a purposeful action or aid p. 283

Informed consent procedures processes that ensure participants understand the nature and purpose of the experiment, including potential risks (both physical and psychological), before agreeing to participate in the study p. 72

Inhibitory effect when the neurotransmitter decreases the likelihood of the postsynaptic neuron firing an action potential p. 110

Integrity the commitment to searching for knowledge and understanding, and the honest reporting of all sources of information and results, whether favourable or unfavourable, in ways that permit scrutiny and contribute to public knowledge and understanding p. 70

Internal factors factors that arise from within the individual p. 365

Internal stressor a stimulus from within a person's body that prompts the stress response p. 135

Internal validity the extent to which an investigation truly measures or investigates what it claims to p. 62

Interneurons neurons that transfer neural messages between sensory neurons and motor neurons p. 93

Investigation methodologies (also known as research methodologies) any of the different processes, techniques and/or types of studies researchers use to obtain information about psychological phenomena p. 14

Irrelevant an initial appraisal of a stimulus as a non-issue for the individual p. 156

J

Justice the moral obligation to ensure that there is fair consideration of competing claims; that there is no unfair burden on a particular group from an action; and that there is fair distribution and access to the benefits of an action p. 70

L

Learning the process of acquiring knowledge, skills, or behaviours through experience p. 120, 192

Lesion an area of tissue that has been damaged due to disease or injury p. 253

Levels of functioning the degree to which an individual can complete day-to-day tasks in an independent and effective manner p. 353

Line graph a graph displaying the relationship between at least two variables using a straight line to connect data points p. 53

Literature review the process of collating and analysing secondary data related to other people's scientific findings and/or viewpoints in order to answer a question or provide background information to help explain observed events, or as preparation for an investigation to generate primary data p. 18

Long-term depression the long-lasting and experience-dependent weakening of synaptic connections between neurons that are not regularly coactivated p. 122

Long-term memory (LTM) a store of memory in which a potentially unlimited amount of information is stored for a relatively permanent amount of time p. 233, 241

Long-term potentiation the long-lasting and experience-dependent strengthening of synaptic connections that are regularly coactivated p. 121

Long-term potentiation a form of neural plasticity, which strengthens neural connections that are repeatedly coactivated p. 382

M

Mean a measure of central tendency that describes the numerical average of a data set, expressed as a single value p. 49

Measures of central tendency descriptive statistics that summarise a data set by describing the centre of the distribution of the data set with a single value p. 49

Measures of variability statistics that summarise and describe the spread and distribution of a data set p. 51

Median a measure of central tendency that is the middle value in a data set ordered from lowest to highest p. 50

Melatonin a hormone released by the pineal gland typically at night-time to induce sleep as part of the sleep-wake cycle p. 300

Memory the process of encoding, storing, and retrieving information that has been previously encountered p. 120, 232

Memory bias a type of cognitive bias caused by inaccurate or exaggerated memory p. 383

Mental imagery the visual representations and experiences of sensory information without the presence of sensory stimuli p. 254

Mental wellbeing an individual's current psychological state, involving their ability to think, process information, and regulate emotions p. 172, 335, 352, 363, 404

Mental wellbeing continuum a tool used to track fluctuating mental wellbeing p. 363

Method of loci (also known as memory palace) a mnemonic device that converts items into mental images and associates them with specific locations to aid memory p. 262

Mind and emotions (in relation to SEWB) ability to effectively manage thoughts and feelings p. 356

Mindfulness meditation the practice of meditation in which an individual focuses on their present experience to promote feelings of calm and peace p. 408

Mixed design an experimental design which combines elements of within-subjects and between-subjects designs p. 22

Mnemonics devices or techniques used to aid the encoding, storage, and retrieval of information p. 261

Mode a measure of central tendency that is the most frequently occurring value in a data set p. 50

Model a representation of a concept, process, or behaviour, often made to simplify or make something easier to understand p. 5

Model (in relation to observational learning) the individual who is performing the behaviour that is being observed p. 209

Modelling the construction and/or manipulation of either a physical model, such as a small- or large-scale representation of an object, or a conceptual model that represents a system involving concepts that help people know, understand, or simulate the system p. 18

Motivation (in relation to observational learning) the fourth stage of observational learning in which the individual must want to reproduce the behaviour p. 210

Motor neurons (also known as efferent neurons) neurons that transmit neural messages about motor movement from the central nervous system to the peripheral nervous system p. 93

Multidimensional made up of different components p. 355

Multimodal using a variety of methods p. 219

N

Naturally occurring altered states of consciousness a type of altered state of consciousness that occurs without intervention p. 283

Negative punishment (also known as response cost) the removal of a desirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring p. 202

Negative reinforcement the removal of an undesirable stimulus, which in turn increases the likelihood of a behaviour reoccurring p. 201

Neocortex (in relation to memory) a brain structure that stores explicit memories p. 244

Neural synapse the region that includes the axon terminals of the presynaptic neuron, the synaptic gap, and the dendrites of the postsynaptic neuron p. 107

Neurochemical a chemical substance that transmits neural information within the nervous system p. 108

Neurodegenerative diseases diseases characterised by the progressive loss of neurons in the brain p. 252

Neurofibrillary tangles an accumulation of the protein tau that forms insoluble tangles within neurons, which then inhibit the transportation of essential substances and eventually kill the neuron entirely p. 253

Neuromodulator a chemical molecule that has an effect on multiple postsynaptic neurons p. 111

Neuron a nerve cell that receives and transmits neural information p. 93

Neurotransmitter a chemical molecule that has an effect on one or two postsynaptic neurons p. 110

Neutral stimulus the stimulus that produces no significant response prior to conditioning p. 193

Non-maleficence (also known as the no-harm principle) the principle of avoiding causing harm p. 71

Non-science ideas formed without empirical evidence or the use of scientific methods or principles p. 3

Non-standardised instructions and procedures when directions and procedures differ across participants or experimental conditions p. 39

Normal waking consciousness (NWC) a state of consciousness in which an individual is awake and aware p. 282

NREM (non-rapid eye movement) sleep a type of sleep characterised by a lack of rapid eye movement and is subdivided into three different stages p. 283, 299

O

Objective data factual data that is observed and measured independently of personal opinion p. 47

Observational learning (also known as social learning, vicarious conditioning, or modelling) a process of learning that involves watching the behaviour of a model and the associated consequence of that behaviour p. 209

Operant conditioning a three-phase learning process that involves an antecedent, behaviour, and consequence, whereby the consequence of a behaviour determines the likelihood that it will reoccur p. 200

Oral traditions practices in which knowledge, stories, and customs are preserved and shared through spoken word and movement p. 263

Order effects the tendency for the order in which participants complete experimental conditions to have an effect on their behaviour p. 38

Outlier a value that differs significantly from other values in a data set p. 50

P

Parasympathetic nervous system a division of the autonomic nervous system that maintains the optimal and balanced functioning of visceral muscles, organs, and glands p. 92

Partial sleep deprivation when an individual sleeps for some duration within a 24-hour-period, but the sleep duration is too short, or the quality of sleep is poor p. 318

Participant-related variables (also known as individual participant differences) characteristics of a study's participants that may affect the results p. 38

Peripheral nervous system a major division of the nervous system comprising every neuron in the body outside the central nervous system p. 91

Perpetuating factors factors that inhibit a person's ability to recover from a specific phobia p. 383

Pineal gland a gland in the brain responsible for the production and release of melatonin p. 300

Placebo an inactive substance or treatment p. 38

Placebo effect when participants respond to an inactive substance or treatment as a result of their expectations or beliefs p. 38

Population (also known as research population) the group of people who are the focus of the research and from which the sample is drawn p. 6, 28

Positive punishment the addition of an undesirable stimulus, which in turn decreases the likelihood of a behaviour reoccurring p. 202

Positive reinforcement the addition of a desirable stimulus, which in turn increases the likelihood of a behaviour reoccurring p. 201

Possible imagined futures hypothetical experiences and situations that an individual has the ability to create and conceptualise in their mind p. 252

Post-mortem examination an assessment of a dead body that occurs to determine the cause of death p. 253

Postsynaptic neuron the neuron that receives neurochemicals from the neural synapse p. 108

Precipitating factors (in relation to specific phobia) factors that increase the susceptibility to and contribute to the occurrence of developing a specific phobia p. 382

Precision how closely a set of measurement values agree with each other p. 59

Presynaptic neuron the neuron that releases neurochemicals from the neural synapse p. 107

Primary appraisal the initial process of evaluating the nature of an incoming stressor, specifically the kind of stress it might cause p. 156

Primary data data collected first-hand by a researcher p. 47

Problem-focused coping the use of coping strategies that directly target the source of the stressor, aiming to reduce it in a practical way p. 157

Procedural memory a type of implicit memory that involves knowing how to carry out tasks that are facilitated by motor skills p. 243

Product, process, or system development the design or evaluation of an artefact, process, or system to meet a human need, which may involve technological applications, in addition to scientific knowledge and procedures p. 18

Protective factors influences that enable an individual to promote and maintain high levels of mental wellbeing p. 404

Pruning the elimination of synaptic connections that are not adequately activated p. 119

Pseudoscience beliefs, theories, and practices that are mistakenly regarded as, or claim to be scientific, but are not because they do not use the methods of science p. 3

Psychoeducation teaching families and supporters of individuals with mental health disorders how to better understand, deal with, and treat their disorder p. 393

Psychological construct an agreed upon description and understanding of psychological phenomena that cannot be overtly measured or observed p. 282

Psychological factors internal factors relating to an individual's mental processes, including their cognition, affect, thoughts, beliefs, and attitudes p. 380

Psychological protective factors (in relation to mental wellbeing) influences that relate to mental processes that can maintain and promote mental wellbeing p. 407

Psychology the scientific study of human mental states and behaviour p. 2

Psychotherapeutic treatments treatments that address dysfunctional emotions, thoughts, and behaviours through therapeutic communication p. 391

Punishment a consequence that decreases the likelihood of a behaviour reoccurring p. 202

Q

Qualitative data data that is expressed non-numerically p. 47

Quantitative data data that is expressed numerically p. 47

R

Random errors errors in data that are unsystematic and occur due to chance p. 59

Random sampling any sampling technique that uses a procedure to ensure every member of the population has the same chance of being selected p. 30

Range a measure of variability that is a value obtained by subtracting the lowest value in a data set from the highest value p. 51

Receptor site a protein molecule on the dendrites of a neuron that receives neurochemicals p. 108

Reflex arc the path along which the neural signal is transmitted as part of the spinal reflex p. 101

Rehearsal a controlled process which involves consciously repeating or manipulating information in short-term memory p. 233

Reinforcement a consequence that increases the likelihood of a behaviour reoccurring p. 201

Reinforcement (in relation to observational learning)

the fifth stage of observational learning in which the individual receives a positive consequence for the behaviour which makes them more likely to reproduce the behaviour again in the future p. 210

REM (rapid eye movement) sleep a type of sleep characterised by rapid eye movement, high levels of brain activity, and low levels of physical activity p. 283, 299

Repeatability the extent to which successive measurements or studies produce the same results when carried out under identical conditions within a short period of time (e.g. same procedure, observer, instrument, instructions, and setting) p. 61

Reproducibility the extent to which successive measurements or studies produce the same results when repeated under different conditions (e.g. different participants, time, observer, and/or environmental conditions) p. 61

Reproduction (in relation to observational learning)

the third stage of observational learning in which the individual must have the physical and mental capabilities to replicate the behaviour p. 210

Rerouting the ability of a neuron that is connected to a damaged neuron to create an alternative synaptic connection with an undamaged neuron p. 119

Resilience the ability to cope with and manage change and uncertainty p. 353

Resistance the second stage of the General Adaptation Syndrome involving maintaining high levels of bodily arousal in response to a persistent stressor p. 146

Respect the consideration of the extent to which living things have an intrinsic value and/or instrumental value; giving due regard to the welfare, liberty and autonomy, beliefs, perceptions, customs and cultural heritage of both the individual and the collective; consideration of the capacity of living things to make their own decisions; and when living things have diminished capacity to make their own decisions, ensuring that they are empowered where possible and protected as necessary p. 71

Retention (in relation to observational learning) the second stage of observational learning in which individuals create a mental representation to remember the model's demonstrated behaviour p. 210

Retrieval the process of accessing information that has been stored in long-term memory and bringing it into our conscious awareness in short-term memory p. 233, 250

S

Sample a subset of the research population who participate in a study p. 29

Sampling technique the way a sample is selected from the population for a study p. 30

Science a field and practice that obtains knowledge and generates theories through observation and experiment p. 2

Secondary appraisal the process of evaluating the resources required and available in order to cope with a stressor p. 157

Secondary data data sourced from others' prior research p. 47

Self-determination the rights of all peoples to pursue freely their economic, social, and cultural development without outside interference p. 415

Semantic memory a type of explicit memory that consists of general knowledge or facts p. 242, 250

Sensory memory a store of memory which very briefly stores raw information detected by the senses p. 233

Sensory neurons (also known as afferent neurons) neurons that transmit neural messages about bodily sensations from the peripheral nervous system to the central nervous system p. 93

Sensory receptor a nerve ending that detects internal sensations in the body and external sensations from the environment p. 98

Serotonin a neuromodulator primarily responsible for the regulation of mood and sleep p. 113

Shift work an occupation that involves working at unusual hours, such as working overnight p. 328

Shock the first substage of the alarm reaction stage involving decreased bodily arousal for a brief period of time following the initial exposure to a stressor p. 146

Short-term memory (STM) a store of memory that temporarily stores a limited amount of information that is consciously being attended to and actively manipulated p. 233

Simulation a process of using a model to study the behaviour of a real or theoretical system p. 18

Single-blind procedure a procedure in which participants are unaware of the experimental group or condition they have been allocated to p. 41

Situational variables any environmental factor that may affect the dependent variable p. 39

Skeletal muscles muscles connected to the skeleton that carry out voluntary motor movements p. 91

Sleep a regular and naturally occurring altered state of consciousness that involves a loss of awareness and disengagement with internal and external stimuli p. 283, 406

Sleep-cycle a 24-hour cycle that is made up of time spent sleeping and time spent awake and alert p. 299

Sleep cycle an approximately 90-minute-period that repeats during a sleep episode in which an individual progresses through stages of REM and NREM sleep p. 283

Sleep deprivation inadequate quantity and/or quality of sleep p. 318

Sleep diaries a record containing self-reported descriptions from an individual about their sleeping periods, including an estimated time spent sleeping and judgements they might have about the quality and nature of their sleep p. 293

- Sleep disorders** disturbances to typical sleeping and waking patterns p. 326
- Sleep episode** the full duration of time spent asleep p. 283, 299
- Sleep hygiene** the practices and habits that promote an individual's sleep patterns p. 334
- Sleep-wake cycle** a 24-hour-cycle that is made up of time spent sleeping and time spent awake and alert p. 298
- Social and emotional wellbeing (SEWB)** a framework that includes all elements of being, and therefore wellbeing, for Aboriginal and Torres Strait Islander peoples p. 355
- Social factors** external factors relating to an individual's interactions with others and their external environment, including their relationships and community involvement p. 381
- Social protective factors (in relation to mental wellbeing)** influences that exist in an individual's social environment that can maintain and promote mental wellbeing p. 408
- Social wellbeing** the ability for an individual to form and maintain meaningful bonds with others, and adapt to different social situations p. 354
- Social-cognitive approaches to learning** theories that propose learning takes place in a social setting and involves various cognitive processes p. 208
- Somatic nervous system** a division of the peripheral nervous system that transmits neural messages related to voluntary motor movement p. 91
- Songlines** multimodal performances conducted as a family or community travels 5D through Country and spaces in the landscape that record journeys, link important sites, and describe ways to live, care for, and nurture Country p. 264
- Specific environmental triggers** stimuli or experiences in a person's environment that evoke an extreme stress response, leading to the development of a phobia p. 384
- Specific phobia** a type of diagnosable anxiety disorder that is categorised by excessive and disproportionate fear when encountering or anticipating the encounter of a particular stimulus p. 367
- Specific phobia** a type of anxiety disorder that is categorised by excessive and disproportionate fear when encountering a particular stimulus p. 381
- Spinal cord** a cable of nerve tissue that extends from the brain, connecting it to the peripheral nervous system p. 91
- Spinal reflex** an unconscious response to sensory stimuli that is initiated by interneurons in the spinal cord independently of the brain p. 101
- Spirituality (in relation to SEWB)** a concept that connects all things, and shapes beliefs, values, and behaviour. It guides knowledge systems, culture, and all that is life for Aboriginal people, including connections to ancestors, the past, the present, and the future p. 357
- Sprouting** the ability of dendrites or axons to develop new extensions or branches p. 119
- Standard deviation** a measure of variability, expressed as a value that describes the spread of data around the mean p. 51
- Stigma** the feeling of shame or disgrace experienced by an individual for a characteristic that differentiates them from others p. 384
- Storage** the retention of information over time p. 233
- Stratified sampling** any sampling technique that involves selecting people from the population in a way that ensures that its strata (subgroups) are proportionally represented in the sample p. 31
- Stress** a psychological and physiological experience that occurs when an individual encounters something of significance that demands their attention and/or efforts to cope p. 134, 366
- Stressful** an initial appraisal of a stimulus as a source of worry or emotional significance for the individual p. 156
- Stressor** a stimulus (internal or external) that prompts the stress response p. 134
- Subjective** something which is based on or influenced by personal feelings or preferences p. 154
- Subjective data** data that is informed by personal opinion, perception, or interpretation p. 47
- Sung narratives** stories that share important cultural, ecological, and survival information through the use of singing, harmony, and rhythm p. 264
- Support** genuine and effective assistance provided by family, friends, and community p. 408
- Sympathetic nervous system** a division of the autonomic nervous system that activates visceral muscles, organs, and glands, preparing the body to respond to a threat or stressor p. 92
- Synaptic gap** the space between the presynaptic neuron and the postsynaptic neuron p. 108
- Synaptic plasticity** the ability of synaptic connections to change over time in response to activity or experience p. 118
- Synaptic transmission** the chemical conveyance of neural information between two neurons across a neural synapse p. 108
- Systematic desensitisation** a therapeutic technique used to overcome phobias that involves a patient being exposed incrementally to increasingly anxiety-inducing stimuli, combined with the use of relaxation techniques p. 392
- Systematic errors** errors in data that differ from the true value by a consistent amount p. 59
- Systems of knowledge (in relation to Aboriginal and Torres Strait Islander approaches to learning)** knowledge and skills are based on interconnected social, physical, and spiritual understandings, and in turn, inform survival and contribute to a strong sense of identity p. 218

T

Table a presentation of data arranged into columns and rows p. 52

Temperature (in relation to zeitgebers) the degree of external heat in the environment that can influence the quality and quantity of sleep p. 336

The flight-or-fight-or-freeze response an involuntary and automatic response to a threat that takes the form of either escaping it, confronting it, or freezing in the face of it p. 138

The scientific method a procedure used to obtain knowledge that involves hypothesis formulation, testing, and retesting through processes of experimentation, observation, measurement, and recording p. 3

The suprachiasmatic nucleus (SCN) an area of the hypothalamus that is responsible for regulating an individual's sleep-wake patterns p. 299

Theory a proposition or set of principles that is used to explain something or make predictions about relationships between concepts p. 5

Threat a further appraisal of a stressor as potentially causing damage to the individual in the future p. 156

True value the value, or range of values, that would be found if the quantity could be measured perfectly p. 59

U

Ultradian rhythms biological and behavioural changes that occur in a cycle that lasts less than 24 hours p. 299

Uncertainty the lack of exact knowledge relating to something being measured due to potential sources of variation in knowledge p. 60

Unconditioned response a naturally occurring behaviour in response to a stimulus p. 193

Unconditioned stimulus the stimulus that produces an unconscious response p. 193

Unconscious response an automatic and involuntary action that is performed by the body independently of the brain p. 100

V

Vagus nerve the longest cranial nerve that connects the gut and the brain, enabling them to communicate p. 165

Validity the extent to which psychological tools and investigations truly support their findings or conclusions p. 62

Variable a condition or component of an experiment that can be measured or manipulated by the experimenter p. 6

Video monitoring the use of camera and audio technologies to record an individual as they sleep p. 293

Visceral muscles, organs, and glands muscles, organs, and glands not connected to the skeleton that are predominantly self-regulating and do not require conscious control p. 92

Voluntary participation a principle that ensures there is no coercion or pressure put on the participant to partake in an experiment, and they freely choose to be involved p. 73

W

Wellbeing a state in which an individual is mentally, physically, and socially healthy and secure p. 352

Withdrawal rights the right of participants to be able to discontinue their involvement in an experiment at any time during, or after the conclusion of, an experiment without penalty p. 73

Within-subjects design (also known as repeated measures or within-groups design) an experimental design in which participants complete every experimental condition p. 21

Written traditions practices in which knowledge, stories, and customs are preserved and shared through writing and reading p. 260

Z

Zeitgebers external cues from the environment that influence the circadian rhythm p. 335

ACKNOWLEDGEMENTS

Images

Figure 2/https://www.niaa.gov.au/sites/default/files/publications/mhsewb-framework_0.pdf/Gee, Dudgeon, Schultz, Hart and Kelly, 2013 p. 54, Figure 4/[https://commons.wikimedia.org/wiki/File:Aboriginal_Pavement_\(5083260200\).jpg](https://commons.wikimedia.org/wiki/File:Aboriginal_Pavement_(5083260200).jpg)/Brisbane City Council p. 55

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Text

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