The big picture

Subtopic question(s)

During this subtopic, you will be working towards answering the following subtopic questions:

- To what extent can we determine what it means to be well?
- To what extent does the environment contribute to the development of mental health disorders?
- To what extent are mental health disorders a function of biology?

The guiding questions in each section help to guide you towards answering the subtopic question(s) at the end of the subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

When people think of 'psychology', they may think specifically of abnormal psychology and the many mental health disorders that typify 'abnormality'. The problem is that there is no clear-cut definition of 'normal' behaviour. From the outset, this raises questions about how abnormal behaviour is classified and diagnosed (**Figure 1**).

Figure 1. Is either chick 'normal'? Why or why not?

Credit: UroshPetrovic, Getty Images

Not only is there disagreement about what counts as normal behaviour, there is also controversy about whether abnormality is necessarily a bad thing. For example:

- A business leader rises to the CEO level in a large multinational company largely due to their obsessive and singular focus on their work and emotionless detachment from their co-workers.
- A soldier kills 150 people and is celebrated by their country as a 'war hero.'

The fact is that some abnormal behaviours are perfectly functional or normal depending on context or perspective. Some behaviours in society may seem strange or unusual, but they do not necessarily indicate mental health disorders or a state of 'unwellness.'

International mindedness

As you consider information, ask questions and formulate your thoughts regarding abnormality, diagnosis and prevalence. Ensure that you consistently consider the role of culture in perspectives of both abnormality and diagnosis.

Recently, psychologists have focused on 'dysfunction' as a framework to identify a psychological disorder. While this may be more useful than past frameworks, it still has problems. These problems will be discussed further in **section 2.1.1** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/final-section-heading-to-follow-id-49426/).

Making connections

It is crucial to connect the questions and information in this subtopic with those about treatments of mental health disorders in **subtopic 2.2** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/the-big-picture-id-49438/).

Proper treatment should be a response to the cause(s) of a disorder. For example, if you have a splinter in your finger that is causing you pain, the treatment would be to remove the splinter.

Understanding the connection between the theoretical cause of a disorder and treatment methods is crucial to psychologists.

The unfortunate truth is that psychological science still does not completely understand the causes of many mental health disorders, although much progress has been made in the last 50 years in the formulation of etiological theories. A major focus of current psychological research is understanding the relationship between the emergence of mental health disorders and biological, cognitive and social factors.

Gaining more insight into these critical areas of etiology and treatment could help improve overall human thriving and well-being.

2.1 Mental health disorders

What is a mental health disorder and how is it diagnosed?

Guiding question(s)

In this subtopic, you are thinking about the question, '**To what extent can we determine what it means to be well?**' This section will help you make an informed response by working through the following guiding questions:

- How can the biological, cognitive and sociocultural perspectives aid in understanding mental health disorders?
- What are some strengths and limitations of diagnostic methodologies?
- How does culture complicate the validity or reliability of diagnosis?

It is important to understand various methodologies and perspectives regarding psychological well-being and dysfunction. What are the strengths and limitations of these various methodologies and approaches? Lastly, what is the role of culture in diagnosis?

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

What is a mental health disorder?

Understanding what to classify as a mental health disorder is easier said than done. In the past, psychologists have considered statistically abnormal behaviour as a method for assessing and determining a disorder (for example, homosexuality used to be listed as a psychological disorder). However, psychologists now focus on dysfunction as a method for assessing and describing mental health disorders. The DSM-V has more than 200 mental health disorders listed, while the ICD-11 has unique codes for over 300 disorders. You have likely heard of some of these, such as: ADHD, generalised anxiety disorder, schizophrenia, anorexia or addiction. However, the most commonly diagnosed mental health disorder worldwide is depression.

According to the World Health Organization (https://www.who.int/news/item/30-03-2017--depression-let-s-talk-says-who-as-depression-tops-list-of-causes-of-ill-health), depression is the leading cause of disability worldwide, with over 300 million individuals suffering from depression. According to the DSM-V, depression is characterised by an individual demonstrating six or more of the following nine symptoms for two weeks or more:

- Depressed mood most of the day, nearly every day.
- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (anhedonia).
- Significant weight loss when not dieting, or weight gain, decrease or increase in appetite nearly every day.

- A slowing down of thought and a reduction of physical movement (observable by others, not merely subjective feelings of restlessness or being slowed down).
- Fatigue or loss of energy nearly every day.
- Feelings of worthlessness or excessive or inappropriate guilt nearly every day.
- Diminished ability to think or concentrate, or indecisiveness, nearly every day.
- Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

It is important to note that these symptoms must cause the individual significant distress or dysfunction and, importantly, these symptoms cannot be the result of substance abuse or some other behaviour. Because depression affects so many individuals worldwide and because it is impacting adolescents at ever increasing rates, depression will be the focus of study throughout this subtopic.

Why is diagnosis important?

When people seek help from a psychological professional for depression or some other mental health disorder, it is usually because they are struggling in some way. The professional will first talk with them to understand their issues and determine whether they have a recognised mental health disorder.

Diagnosing the presence of a mental health disorder is important for three reasons.

1. It guides treatment and provides access to shared knowledge about the condition.
2. It helps explain to the patient why they are experiencing changes in their mental health or daily functioning.
3. It serves to establish population-based prevalence rates. These are a statistic that states the percentage of individuals in a given population who are diagnosed with a given disorder within a specified time period, such as yearly or in a lifetime.

Theory of knowledge

What are the advantages and disadvantages of using labels in knowledge construction?
As you will read later in this section, there is some debate in the psychological community around diagnosis labels. From a knowledge perspective, consider the following questions:

Reflection questions

1. What are the advantages of labels? How do labels contribute to knowledge construction and the development of shared knowledge?
2. What are some possible disadvantages of labels? How might labels hinder knowledge construction?

Strengths and limitations of diagnosis

A key benefit to the diagnosis of mental health disorders is that the categorisation and naming of disorders helps to create an operational definition of disorders. This enables the creation of shared knowledge, reflecting the scientific value of collaboration.

When someone is diagnosed with a mental health disorder, they benefit from existing knowledge about that condition. This is a major advantage of diagnosis. Patients and clinicians avoid starting from the beginning. In fact, a World Health Organization survey of over 4,800 clinicians worldwide (https://onlinelibrary.wiley.com/doi/full/10.1002/j.2051-5545.2011.tb00034.x) found that in response to the question, 'What is the single most important purpose of a classification system?' 40% of respondents selected 'communication among clinicians' as their top choice. In a distant second was the selection, 'inform treatment and management decisions' (Reed et al. 2013)[1].

If someone is diagnosed with depression, they can use the large amount of information already available about depression. They can learn what treatments have worked, what has not, and how their experience compares to others with depression. As Drysdale et al. (2017) (https://www.nature.com/articles/nm.4246) pointed out, there are at least four main subtypes of depression. Do different treatments work better for some subtypes?

None of the above would be possible without a diagnosis. However, some people believe that a diagnosis can harm an individual's well-being too. This belief's origin lies in applying labelling theory to diagnosis. Labelling theory suggests that a person's self-identity and behaviour are influenced by the social labels given to them (**Figure 1**).

Figure 1. Labelling theory asks the question, 'Do diagnosis labels hurt more than they help?'

In this instance, if someone is labelled 'depressed,' their behaviour will conform to their understanding of what a 'depressed person' is. This change in behaviour could be unhelpful for their well-being. If labelling theory is true, using diagnoses might cause more problems than it solves.

Researchers have studied whether labelling theory applies to mental health diagnoses. The results of these studies are not clear-cut, with some supporting the theory and others not.

- Kroska and Harkness (2008) (https://journals.sagepub.com/doi/10.1177/019027250807100207) investigated the effects of labelling on different diagnostic

categories (schizophrenic, affective and adjustment). They found that for affective disorders, such as depression and anxiety, labels did harm people's self-image and behaviour. However, this effect was not seen for other conditions they studied.

- Joëlle Pasman (2011) (https://web.archive.org/web/20170819082116/https://dspace.library.uu.nl/bitstream/handl 94-1-pb.pdf?sequence=2) found that labelling can result in patients adopting negative views about themselves and having reduced self-efficacy. Pasman believes that clinicians should think carefully about whether or not to share a diagnosis label with a patient.

For some people, a diagnosis label may result in some elements of a self-fulfilling prophecy and confirmation bias towards themselves. However, for others, a diagnosis may be liberating and empowering.

Activity

IB learner profile attribute: Inquirer

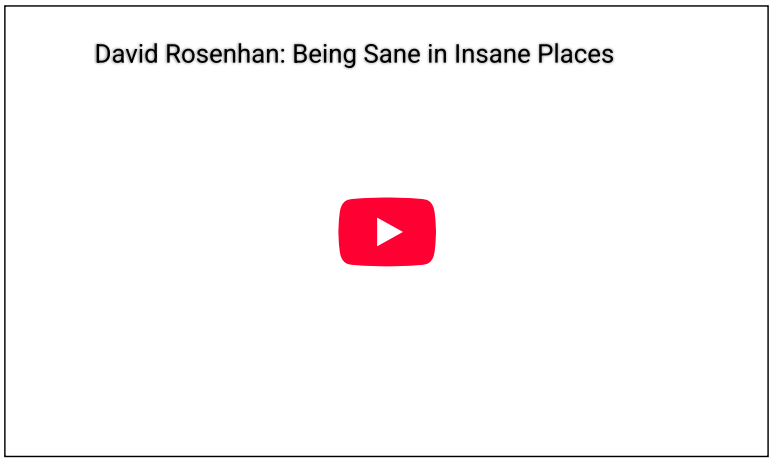
Approaches to learning: Thinking

Time required to complete activity: 30 minutes

Activity type: Individual

The role of labels in psychology

Watch **Video 1** or read about Rosenhan's experiment, Being sane in insane places (https://www.science.org/doi/10.1126/science.179.4070.250).



Video 1. Dr. Rosenhan of Stanford University, USA, discussing his famous participant.

Rosenhan and his Stanford colleagues undertook this experiment to understand the negative effects of labelling. In particular, they wanted to understand the role of confirmation bias in diagnosis.

When you have finished watching **Video 1** or reading about Rosenhan's experiment, consider the following questions.

Reflection questions

1. Which research method was used by Rosenhan and his colleagues?
2. **(Concept application: responsibility)** Discuss any ethical considerations raised by the experiment.
3. What role did the diagnosis label 'schizophrenic' play in the way Rosenhan and his colleagues were treated?
4. Do you believe labels benefit or harm individuals seeking psychological assistance? How can labels interact with confirmation bias to possibly harm patients instead of helping them?
5. How does this experiment support or critique the use of diagnostic manuals in diagnosis?

Diagnosis: validity, reliability and utility

Diagnostic manuals attempt to establish a certain level of objectivity in the process of diagnosis. However, by assessing the symptoms of a mental health disorder based on the testimony of a patient, a great deal of subjectivity is introduced into the diagnosis process. As a result, there are three major issues related to diagnosis: validity, reliability and utility.

Validity is another term for accuracy. If a claim is valid, it is factually accurate. Reliability is another term for consistency. If a claim is reliable, it is consistent. This consistency can come from a singular person (your teacher is reliably strict regarding missing homework) or across multiple sources of information (all teachers in your school are reliably strict regarding missing homework).

A key distinction between validity and reliability is that reliability has nothing to do with accuracy or factualness. A claim, belief or finding can be reliably false.

In psychology, the term interrater reliability refers to the consistency of diagnosis between two or more psychologists. Consider a person seeking help for their problems. They visit three psychologists. Psychologist A says they have depression. Psychologist B says they do not have a mental health disorder. Psychologist C says they have generalised anxiety disorder (GAD). This shows very low interrater reliability. It means at least one of these psychologists is wrong in their diagnosis. Good interrater reliability is important for correct diagnosis and treatment.

Researchers Kendell and Jablensky (2003) (https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.160.1.4) clarified this point in an article published in *The American Journal of Psychiatry*. They wrote, 'Although most diagnostic concepts have not been shown to be valid … many possess high utility by virtue of the information about outcome, treatment response, and etiology that they convey.'[2]

Utility means usefulness. Something can have usefulness even if it is inconsistent or wrong. For example, if Psychologist C misdiagnoses the individual with GAD but their course of treatment results in an improvement in that person's well-being, the diagnosis of GAD is invalid and lacks reliability, *but it does have utility*.

Issues of validity and reliability in diagnosis

Both the ICD-11 (the world's most widely used diagnostic tool) and the DSM-5 have suffered from issues of validity and reliability.

For example, research has indicated that Black Americans are more often diagnosed with schizophrenic disorders than white Americans (Eack et al. 2012 (https://psychiatryonline.org/doi/10.1176/appi.ps.201100388)) when practitioners use the DSM-5, and women are more frequently diagnosed with mood disorders, such as depression or anxiety, (Eaton et al. 2012 (https://psycnet.apa.org/doiLanding?doi=10.1037%2Fa0024780)) regardless of which diagnostic manual is used. These findings are concerning because they suggest that some individuals may not be getting the treatment they need, or they might be spending time and resources on unnecessary treatments – or both.

Additionally, other research suggests that interrater reliability can be quite poor, depending on the disorder assessed. For example, Regier and his team conducted field trials at 11 academic centres (https://ajp.psychiatryonline.org/doi/full/10.1176/appi.ajp.2012.12070999) in the USA and Canada to assess the reliability of selected disorders in the *DSM-5* (Regier et al. 2013). Significantly, both depression and generalised anxiety disorder (GAD) were among the disorders with 'questionable' reliability, which is concerning given their prevalence (**Figure 2**).

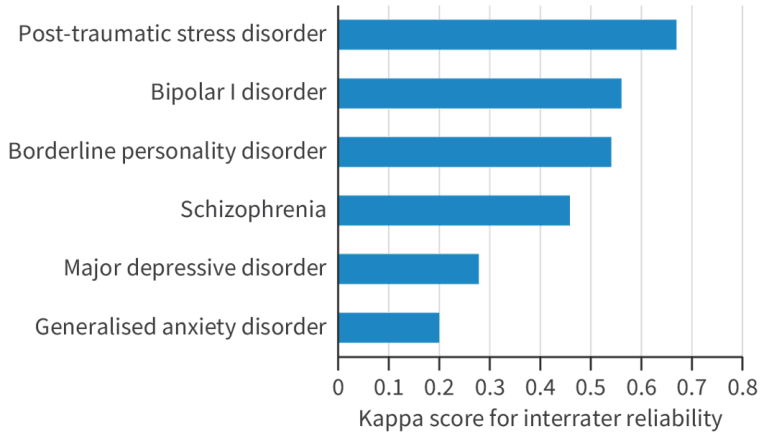


Figure 2. Interrater reliability of different disorders, as reported in Regier et al. (2013) (https://psychiatryonline.org/doi/full/10.1176/appi.ajp.2012.12070999)[3]

More information for figure 2

Bar chart showing the following approximate kappa scores for inter-rater reliability for 6 disorders, from low to high. Generalised anxiety disorder has a score of 0.2. Major depressive disorder has score 0.28. Schizophrenia has score 0.46. Borderline personality disorder has score 0.54. Bipolar 1 disorder has score 0.56. Post-traumatic stress disorder has score 0.68.

Theory of knowledge

Examining paradigms of problem solving

Developmental psychologist Abraham Maslow once remarked, 'If the only tool you have is a hammer, you tend to see every problem as a nail.'[4] Consider this quote in relation to diagnostic methodology.

Reflection questions

1. How might a diagnostic manual like the ICD-11 or DSM-5 function as the 'hammer' in the quote above?
2. If a diagnostic manual is a hammer, what would be the 'nail'?

3. To what extent do you think diagnostic methods affect the prevalence of the diagnosis of a given disorder?

Culture, prevalence and validity

Reliability and validity are different things in diagnosis. However, when a diagnosis is not reliable (meaning different doctors often disagree), it also becomes less valid. This is because the inconsistency in diagnosis shows that errors are being made.

In the case of the Eack et al. (2012) (https://psychiatryonline.org/doi/10.1176/appi.ps.201100388) study, race and culture seem to play a role in reducing both the validity and reliability of the diagnosis of schizophrenic disorder within the African American population. The study showed that clinicians were biased in their diagnoses. African American patients were more than three times as likely to be diagnosed with schizophrenia compared to white patients. This clearly shows how bias can affect how often a disorder is diagnosed in different groups of people.

This is an example of both culture and bias affecting the reliability and validity of the diagnosis. These findings are concerning. Schizophrenia treatments often involve powerful medications; the results suggest that some African American people might be wrongly diagnosed with schizophrenia. As a result, they may be taking strong drugs unnecessarily. This is a serious problem that could harm their health.

Eaton et al. (2012) (https://psycnet.apa.org/record/2011-17694-001) found that depression is more common among women than men. They hypothesised that this is due to gender differences in internalising versus externalising psychological and emotional problems. The researchers found that on average, women keep their feelings inside, while men tend to show their feelings on the outside. This theory is one explanation for why more women are diagnosed with depression than men.

The authors acknowledge that this difference could be cultural rather than biological. In other words, certain cultures may encourage gender-based behaviours and norms that affect how men and women cope with emotional and psychological distress. Thus, Eaton et al. (2012) also demonstrates how culture can affect prevalence of a mental health disorder.

Concept

Bias

Diagnosis is a serious thing — so serious that some psychologists take the perspective that sharing a diagnosis with an individual may not be the best course of action.
It is, therefore, important to continually refine diagnostic frameworks and methodologies to increase their validity. Cultural differences can complicate this, as seen in Eaton et al. (2012), Eack et al. (2012) and Parker et al. (2001).

Reflection questions

1. How could cultural bias affect the validity or reliability of a psychological diagnosis?
2. What could be some solutions to cultural bias affecting validity and reliability of diagnosis?

Parker et al. (2001) (https://ajp.psychiatryonline.org/doi/10.1176/appi.ajp.158.6.857) conducted an extensive and systematic review of the literature to examine the prevalence of depression within the Chinese population. The study aimed to focus specifically on the claim that Chinese people deny depression or express it somatically (physically).

The researchers acknowledge that it was challenging to draw conclusions given:

- the vast cultural differences that exist within the Chinese population.
- a reluctance among Chinese citizens to seek professional mental healthcare.
- issues of diagnosis.

The researchers were confident in concluding that existing evidence supports the idea that Chinese people tend to express depression differently compared to individuals from other cultures. However, Western influences have been changing how Chinese people experience depression, and this process continues today. While the experience of depression and other mental health disorders varies across cultures, it is important to recognise that these disorders exist everywhere and share some common features globally.

While depression is experienced differently in China, it still shares certain etiological commonalities. For example, Lu et al. (2021) (https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(21)00251-0/abstract) found that depressive disorders in China were more prevalent in:

- women than men.
- unemployed people than employed.
- those who were separated, widowed, or divorced than those who were married or cohabiting.

These etiological features are shared across populations and cultures and drive home the major strength of diagnosis – shared knowledge.

Learning outcomes

By the end of this section, you should be able to:

Learning outcomes

- Describe factors contributing to variations in prevalence rates of mental health disorders across different cultures and populations.
- Examine cultural differences in approaches to mental health, citing specific examples to illustrate diverse perspectives.
- Evaluate one or more systems of measurement used to determine psychological wellness or dysfunction.
- Discuss how bias may affect the validity or reliability of a psychological diagnosis.

HL Extension

- Discuss the role of culture in diagnosing and treating mental health issues.

[1] Reed et al. (2013) (https://doi.org/10.1002/j.2051-5545.2011.tb00034.x) 'The WPA-WHO Global Survey of Psychiatrists' Attitudes Towards Mental Disorders Classification,' *World Psychiatry*, Volume 10, Pages 118–131, © Wiley.

[2] Kendell and Jablensky (2003) (https://doi.org/10.1176/appi.ajp.160.1.4) 'Distinguishing Between the Validity and Utility of Psychiatric Diagnoses,' *American Journal of Psychiatry*, Volume 160 © American Psychiatric Association.

[3] Regier et al. (2013) (https://doi.org/10.1176/appi.ajp.2012.12070999) 'DSM-5 Field Trials in the United States and Canada, Part II: Test-Retest Reliability of Selected Categorical Diagnoses,' *American Journal of Psychiatry*, Volume 170 © American Psychiatric Association.

[4] Maslow, Abraham Harold (1966), *The Psychology of Science: A Reconnaissance*, Harper & Row.

What is the relationship between diagnosis and prevalence?

Guiding question(s)

In this subtopic, you are thinking about the question, '**To what extent can we determine what it means to be well?**' This section will help you make an informed response by working through the following guiding question:

- What methodologies exist for diagnosing mental health disorders?

Understanding various methodologies of and perspectives on psychological well-being and dysfunction is important. What are the strengths and limitations of these various diagnosis methodologies and approaches? How do these impact the prevalence of a disorder in a given population?

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

Diagnostic methodologies

Every year, millions of people worldwide are newly diagnosed with a mental health disorder. The World Health Organization estimates (https://www.who.int/news-room/fact-sheets/detail/depression) that around 280 million people (5% of the global population) currently have depression. These diagnoses are used to establish a prevalence rate, which is the percentage of individuals diagnosed with a given disorder within a given population.

Getting a diagnosis is crucial because it is the first step toward better health. After diagnosis, individuals often start treatments or therapy. These efforts require time, energy and money, so it is very important that the diagnosis is correct. The psychological community has developed diagnostic systems or frameworks to assist diagnosis and establish prevalence rates. The most widely used diagnostic frameworks are:

- *The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), edited by the American Psychological Association.

- the *International Classification of Diseases, 11th Revision* (ICD-11) (https://icd.who.int/browse/2024-01/mms/en), published by the World Health Organization.

The DSM-5 and the ICD-11 are checklists (**Figure 1**). They list symptoms for various mental disorders to guide professionals. For example, the DSM-5 has 20 different disorder chapters and 300 distinct mental disorders, each with its own description and symptom-based checklist. The ICD-11 is organised similarly. If an individual has the required number of symptoms for a given mental health disorder, they are considered to be diagnosed with that mental health disorder.

Figure 1. The diagnostic assessment process can be thought of as a 'checklist.'

Credit: Aslan Alphan, Getty Images

Activity

IB learner profile attribute: Thinker/Inquirer/Reflective

Approaches to learning: Thinking/Communicating

Time required to complete activity: 30—40 minutes

Activity type: Individual

Diagnostic criteria summary and presentation

Use the ICD-11 online (https://icd.who.int/browse/2024-01/mms/en) to identify a disorder.

1. Expand drop-down menu 6 on the left navigation panel to see the cognitive disorder list.

2. Select and explore three disorders. Read through the diagnostic statements.
3. Choose one of the disorders.
4. Create a short slideshow presentation, including:
    - a description of the disorder.
    - a summary of the diagnostic criteria.
    - any additional information that is of interest to you.
    - the possible cultural pitfalls or biases that could occur during diagnosis (try to identify two).
5. Present your summary to the class.

Reflection questions

1. **(Concept application: measurement)** What are some strengths and limitations of using diagnostic criteria to diagnose mental health disorders?
2. Does viewing diagnostic criteria through a cultural lens affect your thoughts on diagnosis validity? How might cultural differences impact a diagnosis (and therefore prevalence rates) made through a Eurocentric-created diagnostic tool such as the DSM-V or the ICD-11?
3. For one of the limitations you identified in question 1, suggest a possible solution.

The subjective nature of mental health diagnosis means that culture can greatly influence how symptoms are presented and interpreted. For this reason, additional diagnostic manuals have been developed for use in specific cultures (**Table 1**).

Table 1. Mental health disorder diagnostic manuals and the region in which they are most co used.

Diagnostic framework	Region where it is most frequently used
DSM-5	North America, Europe, Africa
ICD-11	The world's most widely used diagnostic tool: Europe, Africa, Asia Pacific, Australia, New Zealand
Chinese Classification of Mental Disorders (CCMD-3)	China
Latin American Guide for Psychiatric Diagnosis (GLADP)	Latin America

HL Extension

Culture

Given that the most established and widely used method of diagnosis of mental health disorders is a conversational interaction between a psychologist and patient, cultural differences can sometimes create a gap in communication clarity. This gap can show itself as an invalid diagnosis or no diagnosis at all. Research such as that conducted by Howard Garb (2021) (https://doi.org/10.1016/j.cpr.2021.102087) has found that both gender and race can influence diagnosis and, therefore, prevalence rates of a given disorder.

Garb found that race bias existed for mood disorders such as PTSD and depression as well as eating disorders. Garb found that gender bias existed for autism and ADHD as well as some personality disorders.

Reflection questions

1. Identify possible diagnosis issues arising from cultural differences between a psychologist and a patient.
2. How might culture have impacted the development of the different diagnostic frameworks, such as the DSM-5 or the ICD-11?
3. Why are culturally specific diagnostic frameworks necessary (see **Table 1**)?
4. Identify the role of culture in diagnosing and treating mental health issues.

Despite efforts to enhance and refine diagnostic methods' accuracy and cultural sensitivity, diagnosing still poses significant challenges (see **section 2.1.1** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/final-section-heading-to-follow-id-49426/)). This is why psychologists and researchers are continuously refining diagnostic manuals, as well as looking for alternative methodologies and tools for diagnosis.

The lack of validity and reliability of diagnosis is one obstacle to establishing valid prevalence rates of a given disorder. Other factors that can impact prevalence rates are:

- access to care. Individuals who lack access to a clinician are by default excluded from statistical descriptions of mental health such as prevalence rates. There are many reasons individuals may lack access. For example, an individual may not be able to afford the visit to a clinician or perhaps there are no clinicians available to them in their local area.

- social stigma. In some cultures, seeking help for mental health is viewed negatively and therefore individuals do not want to appear 'weak' or 'helpless' in some way. This cultural attitude can lead to individuals not seeking mental health help. As a result, in communities such as these, prevalence rates may be reduced.

Concept

Measurement

Stop and reflect for a moment on what you know about the diagnosis of mental health disorders and consider the following questions.

Reflection questions

1. What are the advantages of a diagnostic methodology?
2. What are the disadvantages of a diagnostic methodology?
3. Why might accurately measuring (diagnosing) mental health disorders be challenging?

Alternative approaches: research domain criteria

Recognising the need to improve diagnosis and treatment, the National Institute of Mental Health (NIMH) started the Research Domain Criteria (RDoC) initiative (https://www.nimh.nih.gov/research-priorities/rdoc/index.shtml). This programme explores new ways to research psychological disorders. The NIMH writes (https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/about-rdoc):

> 'Traditionally, mental illnesses have been conceptualised as disorders that are diagnosed based on the number and type of symptoms and the presence of distress or impairment. Such a view of mental disorders – and the resulting diagnostic systems – provides benefits such as reliability and ease of diagnosis across a variety of contexts. However, this approach has come at the cost of numerous tradeoffs.'

The NIMH goes on to state that those tradeoffs include a lack of validity in diagnosis due to comorbidity of psychological disorders. Additionally, two people can experience the same mental health disorder differently and, therefore, present different symptoms. Using diagnostic symptom counts to determine whether someone is 'well' or 'unwell' is also relatively inconsistent. For example, a person might not meet the full criteria for a disorder such as depression but could still be unwell. The RDoC method aims to overcome these issues by linking the causes of disorders with their treatments.

The NIMH is clear that the RDoC is not intended to replace current diagnostic systems. Instead, it is designed to offer deeper insights into mental health disorders by examining how psychological and biological systems vary in their dysfunction (NIMH (https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/about-rdoc)). The RDoC uses six domains (https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/constructs/rdoc-matrix):

- arousal/regulatory.
- positive valence.
- negative valence.
- social processes.
- sensorimotor.
- cognitive.

The RDoC approach views mental health in the context of these six domains of human neurobehavioral functioning, as opposed to symptom-based criteria. These domains are also investigated in the context of both lifespan and the environment – not analysed in isolation.

International mindedness

Reflection on diagnosis

1. Why must psychologists be culturally sensitive and responsive? How can an understanding of cultural differences inform diagnosis?
2. How might cultural sensitivity provide additional perspectives of etiological causation?

Brain imaging techniques

Brain scan technology has revolutionised neuroscience, medicine and psychology. Before its development, the only way to examine a human brain was via invasive brain surgery. Now, through PET (positron-emission tomography) scans, fMRI (functional magnetic resonance imaging), MRI (magnetic resonance imaging) and EEG (electroencephalogram) tests, doctors and scientists can acquire a wealth of information about the functionality (or dysfunction) of a patient's brain (**Figure 2**).

MRIs are used to take pictures of soft tissue through the magnetisation of protons within hydrogen. The MRI machine uses software that can interpret the feedback into visual images. fMRIs work in a similar way to MRIs. However the difference is that fMRIs are able to measure brain activity through focusing on blood flow. Because oxygen for brain activity is delivered to the brain through blood flow, the flow of blood in the brain works as a proxy for brain activity.

PET scans work through injecting the patient with a small amount of radioactive glucose, which then can be traced throughout the brain. The most active areas of the brain will use the most glucose. And finally, EEGs measure the electrical activity put off by the neurochemical reactions in the brain.

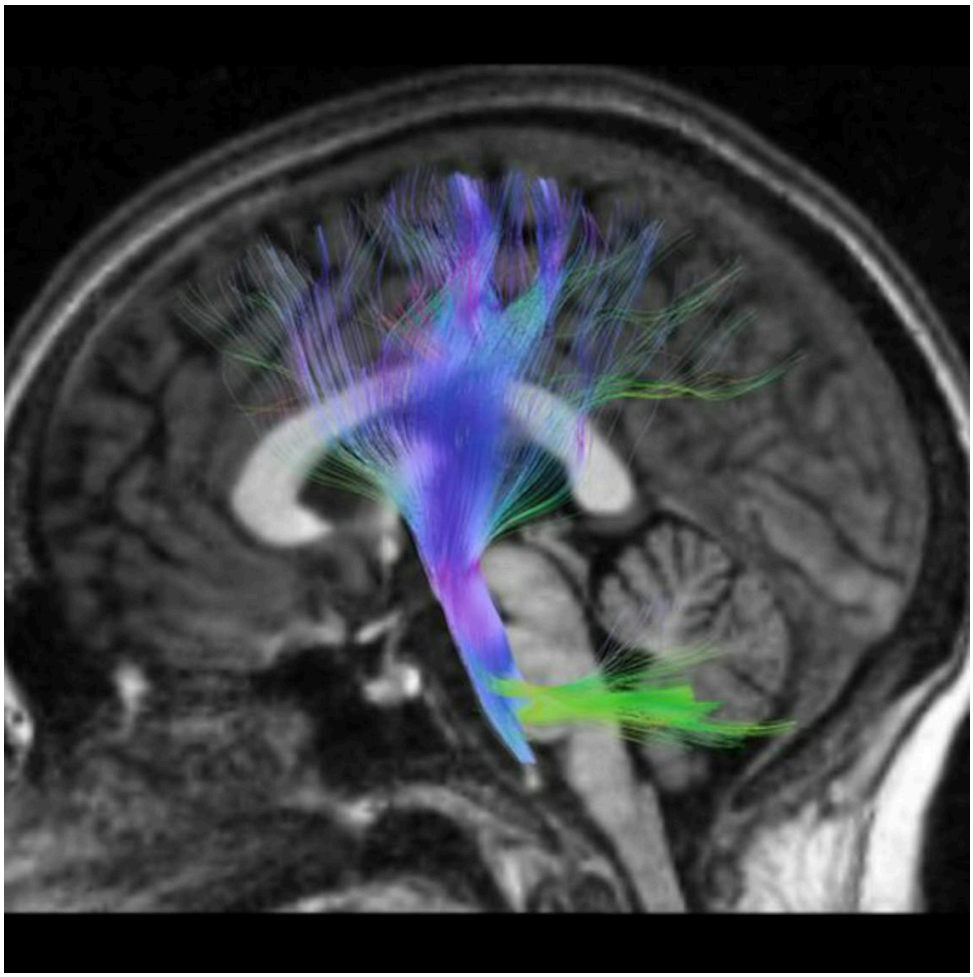


Figure 2. fMRI technology creates images of brain activity in neural networks.

Credit: Sherbrooke Connectivity Imaging Lab (SCIL), Getty Images

Andrew Drysdale and a team of researchers at Cornell Medical Center in New York, USA, conducted an fMRI study to investigate the role of neural networks in depression (Drysdale et al. 2017 (https://www.nature.com/articles/nm.4246)). They were motivated by the fact that current diagnostic systems have limitations, which can result in ineffective treatment.

The aim was to investigate whether different 'types' of depression share a common neurobiological signature. The researchers used a multisite sample of 1,188 participants currently diagnosed with depression. All participants underwent fMRI scans to identify any shared abnormal connectivity patterns.

Four different patterns of connectivity emerged, indicating four different 'subtypes' of depression. Importantly, these subtypes of connectivity corresponded with how the patients experienced depression.

The biological subtypes identified via fMRI scans and aligned with the testimony of participants were:

- anhedonic and anxious.
- mostly anhedonic.
- mostly anxious.
- not anhedonic and not anxious.

The researchers conducted tests outside their original study. They found that the biomarkers identified from the initial fMRI data could accurately predict the specific type of depression a patient had. Depending on the subtype, they achieved accuracy rates between 82% and 93%. This meant that the neurological connectivity biomarker (or lack thereof) could identify that an individual was experiencing depression *and* these biomarkers could also predict the precise type of depression that individual was experiencing.

Perspective lens

Biological and cognitive approaches

As already mentioned in this section, the NIMH has acknowledged that viewing diagnosis from a strictly **cognitive** perspective brings some benefits but also some limitations. Specifically, a cognitive approach to diagnosis relies on the patient reporting their own symptoms and then for these symptoms to be interpreted by a clinician. A great deal can be 'lost in translation' during this cognitive-focused process.

Andrew Drysdale and his team (Drysdale et al. 2017 (https://www.nature.com/articles/nm.4246)) decided to look at what would happen if the issue of diagnosis was approached from a **biological** perspective.

Reflection questions

1. What are possible advantages of a biological approach to diagnosis?
2. What are possible limitations of approaching diagnosis from the biological perspective?

These findings are truly revolutionary, not only regarding diagnosis but also treatment. The findings of Drysdale et al. (2017) demonstrate how technology can be used to assist in the treatment of depression. Specifically, technology can be used to increase diagnosis validity and then match a treatment to that depressive subtype (see **section 2.2.2** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/how-might-social-connection-and-culture-reduce-the-risk-of-depression-id-49440/) and **section 2.2.3** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/what-is-the-relationship-between-etiology-and-treatment-id-49441/)).

HL Extension

Technology

Technology has greatly increased our knowledge of psychological science. Consider the findings of Drysdale et al. (2017). Take a moment to reflect on and describe technology's role in treating health problems. To help your discussion, reflect on the following questions:

Reflection questions

1. Why might using technology for diagnosis be more advantageous than traditional diagnostic methods?
2. Discuss the positives and negatives of relying on technology such as fMRI software to aid in diagnosis of mental health disorders.

Other diagnosis tools

Psychologists and researchers have developed various disorder-specific assessment tools to aid them in diagnosis validity and mental health measurement. Some frequently used assessment tools are outlined in **Table 2**.

Table 2. Disorder-specific measurement tools used by psychologists.

Measurement tool	Uses
The Hamilton Depression Rating Scale (Ham-D) (https://dcf.psychiatry.ufl.edu/files/2011/05/HAMILTON-DEPRESSION.pdf)	Ham-D is the most widely used **depression** assessment scale. The Ham-D is not used to diag depression *per se*, but rather used once depressi has been diagnosed to assess the 'severity' of depression and measure progress. The scale consists of 17 (some versions have 21) i that require the participant's response. Each item scored on a scale of 0–4 and the scores are tota • 0–7: normal (no depression) • 8–13: mild depression • 14–18: moderate depression • 19–22: severe depression • 23 or more: very severe depression

Measurement tool	Uses
Generalised anxiety disorder (GAD-7) (https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/410326)	GAD-7 is a tool used to diagnose **generalised an disorder**. It was developed as a quick and clear method of diagnosis for generalised anxiety diso The measurement tool consists of seven items th answered by the patient according to a likert sca ranging from 0–3 (0 = not at all; 3 = nearly ever day). • 0–4: minimal anxiety • 5–9: mild anxiety • 10–14: moderate anxiety • 15–21: severe anxiety
Children's Depression Inventory (http://www.apa.org/obesity-guideline/depression-inventory.pdf) (CDI 2TM)	CDI 2TM is a multi-rater (teacher, parent, chil assessment tool designed to measure and ide **depression in children**. This tool is designed t childhood context and, therefore, offers more specificity than standard diagnostic framewor like the ICD-11 or DSM-5.

Concept

Measurement

Prevalence of mental health disorders

Diagnostic manuals and frameworks are useful for creating shared knowledge around a given mental health disorder. One component of this shared knowledge is prevalence. Prevalence refers to the number of individuals who are diagnosed with a specific mental disorder in a given population. For example, the global prevalence of a major depressive disorder, or the prevalence of a major depressive disorder among Turkish immigrants in Austria.

Prevalence rates are useful for making comparisons across populations. They can inform the theory of mental health disorder origin.

Reflection questions

1. How might cultural attitudes towards mental health and well-being affect prevalence rates of mental health disorders?
2. What other factors may affect prevalence in a given population?

Learning outcomes

By the end of this section, you should be able to:

- Describe the use of one or more brain imaging techniques in investigating human behaviour.
- Describe factors contributing to variations in prevalence rates of mental health disorders across different cultures and populations.
- Examine cultural differences in approaches to mental health, citing specific examples to illustrate diverse perspectives.
- Evaluate one or more systems of measurement used to determine psychological wellness or dysfunction.

HL Extension

- Discuss the role of technology in assisting in the prevention or treatment of health problems.
- Discuss the role of culture in diagnosing and treating mental health issues.

2.1 Mental health disorders

Can society cause mental health disorders?

Guiding question(s)

In this subtopic, you will think about the question, '**To what extent does the environment contribute to the development of mental health disorders?**' This section will help you make an informed response by working through the following guiding questions:

- In what ways are social and environmental elements linked to the etiology of depression?
- What evidence exists to support the diathesis—stress model of depressive etiology?

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

The role of environmental factors on mental health and the diathesis—stress model

Why do people get depressed?

By identifying the factors that contribute to mental health disorders, psychologists can work towards their broader goal of helping people experience well-being. This understanding is key to developing effective treatments and prevention strategies.

The unfortunate reality is that there are many people in the world who experience mental health disorders. In 2021, for example, the depression rate (https://ourworldindata.org/grapher/depressive-disorders-prevalence-ihme) in the United States was 5.5%, while in China it was 2.9%. While that difference may not seem significant, it equates to millions of people either suffering from or not suffering from a disease.

The question is: *Why is there such a large difference between these two cultures?*

If depression and other mental health disorders were strictly caused by biological factors, there would be a more equal distribution of the disorders throughout the world. This, however, is not the case. Prevalence of psychological disorders like depression can vary greatly between cultures and countries. One explanation for this is that environmental factors contribute to depressive etiology.

In a presentation during the Bay Area Science Festival (https://www.youtube.com/watch?v=TnlZwfD-GiU) on what it means to be human, Stanford University neuroscientist Robert Sapolsky spoke extensively on his belief that, in order to understand being human, we have to study how the brain works in a social context.

UCLA psychiatrist Daniel Siegel echoed the importance of environmental factors on brain function and development. In his book *The Developing Mind* (https://www.guilford.com/books/The-Developing-Mind/Daniel-Siegel/9781462542758), he wrote, 'The relationships we have, the air we breathe, the activities we engage in—these environmental aspects shape our brain's development and functioning.'[1]

Perspective lens

Sociocultural approach

According to Dr Thomas Insel, who headed the NIMH from 2002 to 2015, all mental health disorders are brain disorders. It is therefore fair to ask how viewing mental health disorders from a **sociocultural** perspective could be of benefit to researchers and psychologists. The answer of course lies in the very important scientific realisation that our environments (and thoughts) can impact our neurobiology.

Throughout this subtopic, you will be presented with different frameworks that investigate this relationship, such as the diathesis—stress model of mental health disorder etiology, as well as an examination of the impact of heavy social media

use on mental health (see section 2.1.4 (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/social-media-and-depression-id-49429/)).

Reflection questions

1. Consider ways in which an individual's environment may impact their mental health and well-being. Start by identifying a list of sociocultural factors that you think could impact an individual's mental health and well-being.
2. Choose one or two factors from your list and use a research database to identify research in support of those factors having an impact on mental health and well-being.

Psychology has revealed the powerful interplay between our environment and biology (**Figure 1**). While we have long known that physical toxins affect our development, we now understand that cognitive and emotional stimuli can be 'toxic' too. Stress and trauma are two such toxins. Trauma is typically more acute and sudden than daily stress, but both can contribute to mental health disorders.

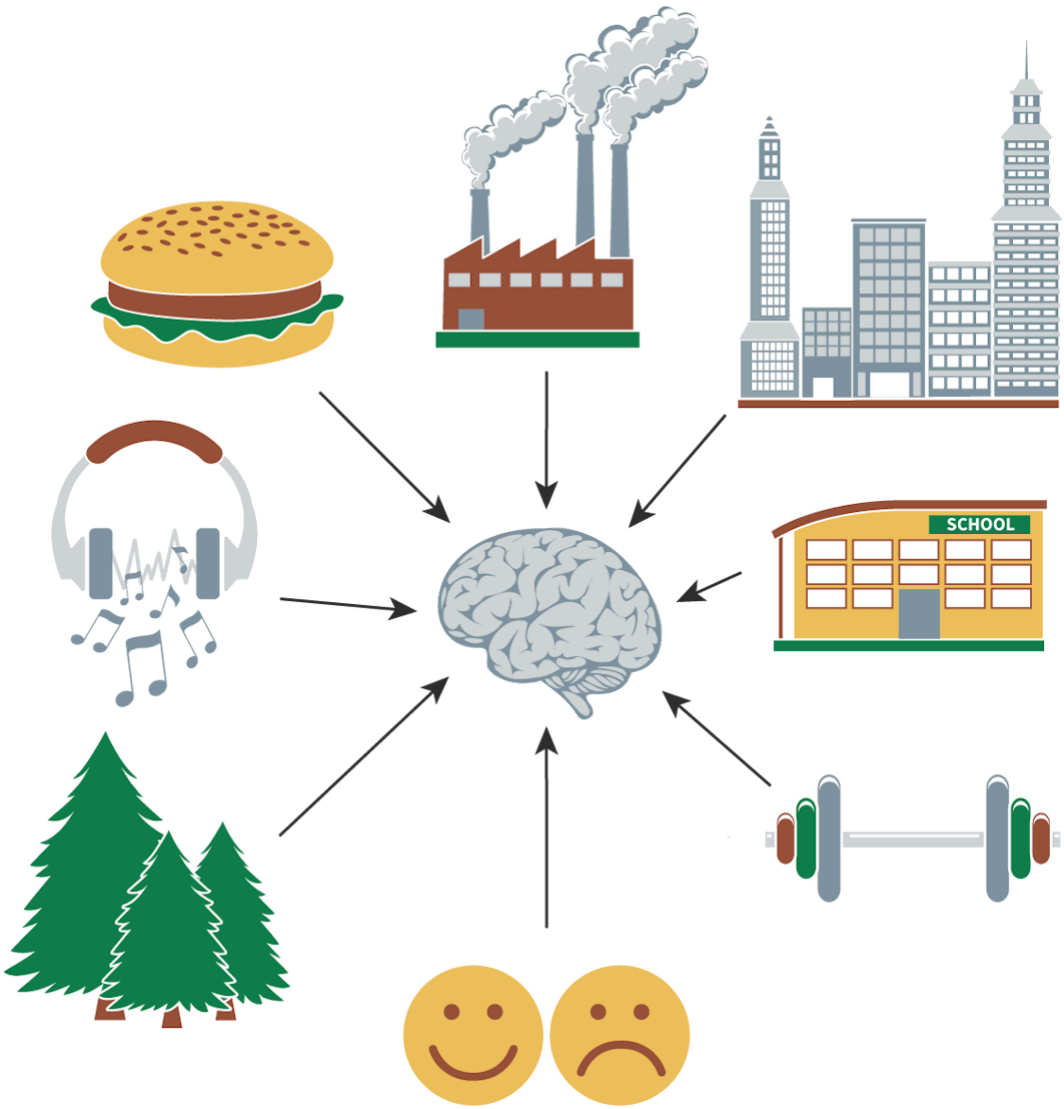


Figure 1. Neuroscientists and psychologists have only recently started to recognise the profound influence of environmental factors on our brain and biology.

From a reductionist perspective, all mental health disorders are biological brain disorders. However, this overlooks cognitive and environmental factors that shape our biology, such as stress or physical experiences. Researchers such as Sapolsky and Siegel emphasise the complex dynamic between our environment and mind, encouraging psychologists to consider this relationship more closely.

Making connections

Reductionism

Reductionism is a psychological approach that reduces behaviour and psychological phenomena to their most basic component parts. This, in essence, means reducing behaviour to its neurobiological origins, as all behaviour and cognition originates in the brain.

Understanding the concept of reductionism is a content-based learning outcome. You should be comfortable discussing the concept of reductionism and its strengths and limitations.

If you understand and can articulate the role of the environment in shaping biology, you have identified a limitation of reductionism. Yes, 'everything is biological.' However, that statement — and reductionism itself — leaves out various environmental factors that affect biology.

Therefore, is all behaviour actually biological? Or is it more accurate to say, 'all behaviour is caused by the environment'?

While these questions do not have clear answers, psychologists are beginning to appreciate the subtle interaction between biology and the environment. Understanding this interaction is necessary when discussing the concept of reductionism.

Diathesis—stress model: a biological-environmental interaction

The diathesis–stress model explains mental health disorders as a result of biological vulnerabilities, activated by environmental triggers. This framework examines how biology and the environment interact to cause mental health

disorders. The Caspi et al. (2003) (https://www.science.org/doi/10.1126/science.1083968) study provides evidence supporting this approach.

Making connections

The diathesis—stress model and genetics

The Caspi et al. (2003) (http://science.sciencemag.org/content/301/5631/386) study is an example of gene and environment interaction, and, therefore a clear example of the diathesis—stress model at work.

In the study, the biological vulnerability is the individual carrying the short allele of the 5-HTT serotonin transporter gene (see **section 2.1.6** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/genetics-and-mental-heath-id-49431/)). While this is not enough to cause depression, the vulnerability is worsened or activated by the environment. In the case of the Caspi et al. (2003) study, the environmental factor measured was major stressful life events.

In 2018, Lucía Colodro-Conde and a team of researchers (https://www.nature.com/articles/mp2017130) investigated the validity of the diathesis–stress model as a framework for depressive etiology. They carried out an advanced statistical analysis of 5,221 participants. The researchers had data from each participant, including:

- measures of stressful life events.
- social support scores.
- depression symptom score (DSM-IV).
- depression diagnosis based on DSM-IV.
- genetic risk scores for major depressive disorder (MDD) calculated from the results of the most recent analysis from the Psychiatric Genomics Consortium.

The researchers found that there was significant support for the diathesis–stress model as an explanatory framework for the development of depression (**Figure 2**).

If environments are indeed a contributing factor in the development of depression, an important question to ask is, ‘Can culture contribute to the development of mental health disorders?’

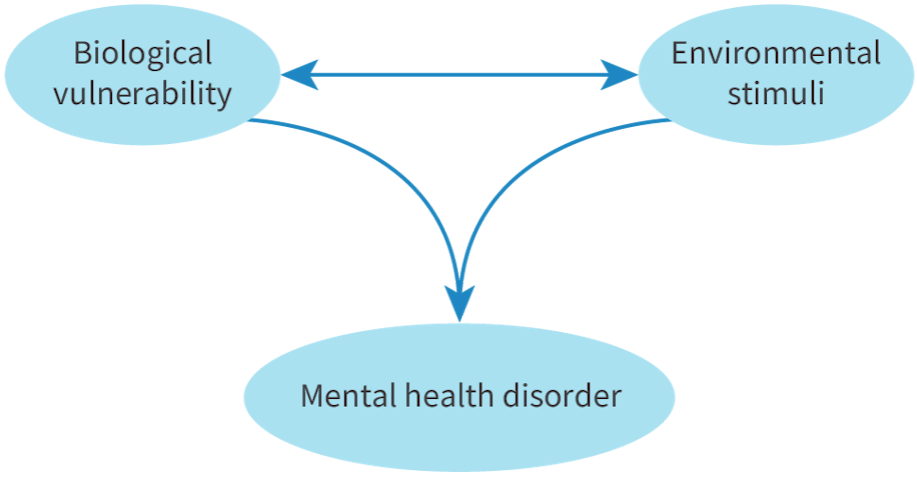


Figure 2. Increases in prevalence of poor mental health among girls and young women in the USA (Twenge, 2020 (https://psychiatryonline.org/doi/10.1176/appi.prcp.20190015)).

More information for figure 2

Diathesis stress model diagram in which a two-way arrow links biological vulnerability with environmental stimuli. One-way arrows from both of these factors show that they can contribute to a mental health disorder.

Culture and depression

Chiao and Blizinsky (2009) (https://royalsocietypublishing.org/doi/10.1098/rspb.2009.1650) studied how culture affects depression. They looked at both environmental factors and the 5-HTT serotonin transporter gene, previously linked to increased depression risk. Their unique approach focused on how culture might reduce, rather than cause, depression.

The study gathered data from 29 countries worldwide. They looked at the frequency of the short 5-HTT gene allele using peer-reviewed studies. They then used Gert Hofstede's published data (https://www.hofstede-insights.com/country-comparison-tool) on the extent to which a given culture can be considered 'individualistic' or 'collectivist.' Lastly, they examined published rates of depression in each of those countries.

They found that, even though some countries had higher prevalence rates of individuals carrying the short allele of the 5-HTT gene, depression rates were actually *lower* if those countries had a collectivist culture.

The results of Chiao and Blizinsky (2009) are surprising, given other researchers' findings. For example, Caspi et al. (2003) (http://science.sciencemag.org/content/301/5631/386) found higher overall rates of depression within their sample when significant stress was present. Chiao and Blizinsky (2009) concluded that certain elements of culture can prevent the development of depression by reducing the effects of environmental stress on the individual. They wrote, 'Our findings ... support the notion that cultural values buffer genetically susceptible populations from increased prevalence of affective disorders.'[2]

Activity

IB learner profile attribute: Thinker/Knowledgeable

Approaches to learning: Research/Thinking

Time required to complete activity: 10 minutes

Activity type: Individual/Pair

Tools of the inquirer: Questioning

Concept application: Perspective

An essential skill for any scientist is the ability to ask good questions because questions can turn into research investigations! Reflect on your curiosity after reading about the Caspi et al. (2003) and Chiao and Blizinsky (2009) studies.

1. Generate three to five questions inspired by the results of these studies.
2. Share your questions with a partner and hypothesise about possible answers to them.

Chiao and Blizinsky's (2009) results suggest that culture plays a role in preventing depression, supporting the diathesis–stress model. This may explain the significant difference in depression rates between the United States and China. The challenge now is to identify specific cultural elements that either contribute to or prevent mental health disorders like depression.

HL Extension

Culture

It is important to reflect on and consider the role of culture in both ameliorating and contributing to depressive etiology. As an HL student, you should strive to analyse different cultural 'elements' that may explain the findings, such as those articulated by Chiao and Blizinsky (2009), and other researchers who came to similar conclusions.

Consider what other cultural factors besides collectivism and individualism may be relevant to the diathesis—stress model.

Application

1. What other cultural factors besides collectivism and individualism may be relevant to the diathesis—stress model?

Prevalence, diagnosis and culture

Given that prevalence rates are directly related to diagnosis, it is important to understand the impact of culture on diagnosis. A review by the Mayo Clinic published in 2009 (https://doi.org/10.1002/j.2051-5545.2009.tb00233.x) found that psychologists and psychiatrists should consider the following elements in diagnosis:

- Cultural variables
- Family data
- Pathogenic factors (examples of these are media, socio-political structures, rules and values of public behaviour, church affiliation, schedules, rituals, schooling norms).

Application

1. Given what you know about the diagnostic method of assessment, why would it be important for clinicians to consider the above cultural elements put forth by the Mayo Clinic?
2. How might a lack of validity in diagnosis impact prevalence rates?
3. Use a database to identify a study that investigates the impact of culture on prevalence rate or diagnosis of a specific mental health disorder. Share that finding with your teacher or a partner.

Trauma and depression

Researchers have examined the connection between war-related stress and depression rates. The hypothesis suggests that societies experiencing constant, severe stressors will show higher depression incidence. This follows from the understanding that stress can trigger depression onset.

A recent study by Kurapov et al. (2023) (https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2023.1190465/full) investigated the post-war incidence of depression among 706 Ukrainians (men and women, of differing ages and various regional locations). The researchers found that, 'a large portion of the Ukrainian population shows increased levels of anxiety, depression, and stress due to the war.' They went on to write that, 'Direct exposure to trauma predicted increased anxiety and depression.'[3] This finding is consistent with other research that establishes a link between trauma, stressful life events and the onset of depression.

Concept

Causality

Causality is an important concept for both IB students and psychologists. Psychology's goal is to increase human thriving. Therefore, it is imperative that psychologists understand what can cause thriving and what can cause suffering.

This, of course, is much easier said than done, because the human mind is incredibly complex. However, despite the challenges associated with understanding causality, scientists still ask the question because understanding the answer can increase well-being.

Reflection questions

1. Do you think that psychologists will ever be able to clearly identify the cause of depression? Why or why not?
2. What localised brain region is associated with the processing of negative stressors and emotions? How might you link environmental factors to possible biological factors? How might this link complicate concepts of causality?

Other environmental factors

Other environmental factors unrelated to stress may contribute to a depressive etiology.

Researchers Qiu et al. (2023) (https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2801241) from the Harvard T.H. Chan School of Public Health, USA, sought to investigate the extent to which long-term exposure to air pollution is linked to the onset of depression. In their conclusion, they wrote, 'We observed statistically significant harmful associations between long-term exposure to elevated levels of air pollution and increased risk of late-life depression diagnosis.' [4]

Concept

Responsibility

The link between environmental factors, such as pollution and stress, and mental well-being highlights the role of scientific knowledge in shaping public policy. Examining the responsibility of governments to act on this knowledge raises important questions about accountability and the promotion of societal well-being.

Reflection question

1. Do governments have a responsibility to act on scientific knowledge regarding environmental factors that have been linked to a reduction in mental well-being? Consider the examples of pollution and stress.

This finding is supported by researchers Ali and Khoja (2019) (https://www.ochsnerjournal.org/content/19/1/4) from The Aga Khan University, Pakistan, who found that '...for every 1 standard deviation rise in particulate matter over an average of PM2.5 concentration increases the likelihood of having a mental illness (including depression) by 6.67%.'[5]

It might seem obvious that living in a war-torn area can increase depression prevalence rates. However, it is not as clear why pollution would also affect this. In the following activity, you can choose to look more closely at environmental pollutants and their link to depressive etiology, or you can investigate a different environmental factor.

Activity

IB learner profile attribute: Thinker/Inquirer

Approaches to learning: Thinking/Researcher

Time required to complete activity: 30—60 minutes

Activity type: Individual

Investigating environmental effects on behaviour

Concept application: Causality

Intuition can be a powerful tool for scientists. While intuition alone is insufficient to substantiate a scientific claim, it can serve as a source of inspiration and question formulation.

Use your intuition to consider possible relationships between environmental factors and behaviour.

Remember, in a psychological context, the word 'environment' includes anything that is not inherently biological. Environmental factors include, but are not limited to:

- the language you speak.
- the school you attend.
- the way your parents treat you.
- the social relationships you have with your friends.
- the food you eat.
- the air you breathe.
- the media you consume.

Your task is to identify an environmental factor and use your skills as a researcher to discover whether there is any evidence to support its contribution to your chosen disorder/behaviour.

1. Generate three to five statements of curiosity about the possible relationship between an environmental factor and a behaviour.
2. Research answers to some of your most interesting questions.
3. Choose one question for which you have valid evidence and develop a possible explanation for or answer to your question.

Learning outcomes

By the end of this section, you should be able to:

- Identify the role of environmental factors on mental health disorders.

- Describe factors contributing to variations in prevalence rates of mental health disorders across different cultures and populations.
- Discuss the interaction of environmental factors and genetics in human behaviour.
- Explain the role and use of cognitive models in understanding mental health disorders.
- Discuss the extent to which one can say that social environments cause depression or some other psychological disorder.
- Discuss the extent to which governments have a responsibility to take action against societal elements that reduce well-being.

HL Extension

- Discuss cross-cultural comparisons of the prevalence of mental health issues.
- Discuss the role of technology on mental health problems.

[1] Siegel, Daniel (2020) *The Developing Mind: How Relationships and the Brain Interact to Shape Who We Are*, Third Edition, Guildford Press

[2] Chiao, J.Y. and Blizinsky, K.D. (2010) (http://doi.org/10.1098/rspb.2009.1650) 'Culture–gene coevolution of individualism–collectivism and the serotonin transporter gene,' *Proceedings of the Royal Society B*, Volume 277, Pages 529–537. Licenced under the CC-BY-4.0 licence https://creativecommons.org/licenses/by/4.0/ (https://creativecommons.org/licenses/by/4.0/).

[3] Kurapov, A. et al. (2023) (https://doi.org/10.3389/fpsyt.2023.1190465) 'Six months into the war: a first-wave study of stress, anxiety, and depression among in Ukraine,' *Frontiers in Psychiatry*, Volume 14. Licenced under the CC-BY-4.0 licence https://creativecommons.org/licenses/by/4.0/ (https://creativecommons.org/licenses/by/4.0/).

[4] Qiu X, et al. (2023) (https://doi.org/10.1001/jamanetworkopen.2022.53668) 'Association of Long-term Exposure to Air Pollution With Late-Life Depression in Older Adults in the US,' *JAMA Network Open*, Volume 6. Licenced under the CC-BY-4.0 licence https://creativecommons.org/licenses/by/4.0/ (https://creativecommons.org/licenses/by/4.0/)

[5] Ali, N.A. and Khoja, A. (2019) (https://doi.org/10.31486/toj.19.0011) 'Growing Evidence for the Impact of Air Pollution on Depression,' *Ochsner Journal*, March 2019, Volume 19 © Academic Division of Ochsner Clinic Foundation.

2.1 Mental health disorders

To what extent does social media contribute to the development of depression?

Guiding question(s)

In this subtopic, you are thinking about the question, '**To what extent does the environment contribute to the development of mental health disorders?**' This section will help you make an informed response by working through the following guiding question:

- **To what extent has social media use decreased cognitive well-being?**

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

The iPhone was invented in 2007. By 2012, smartphones were a major part of many teenagers' lives (Haidt, Rausch & Twenge (https://tinyurl.com/SocialMediaMentalHealthReview)). In 2012, Western Europe and North America also experienced a massive rise in the prevalence rate of depression, anxiety, loneliness and self-harm among teenagers (**Figure 1** and **Table 1**).

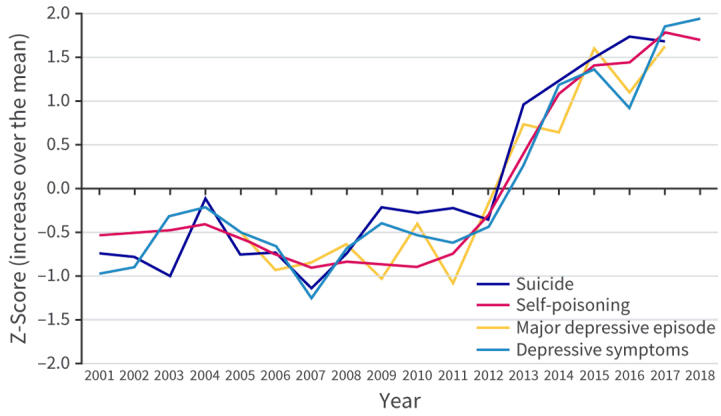


Figure 1. Increases in prevalence of poor mental health among girls and young women in the USA.

Source: Data from Twenge (2020) (https://psychiatryonline.org/doi/10.1176/appi.prcp.20190015)[1]

More information for figure 1

Line graph showing the z-scores, or increases over the mean, of indicators of poor mental health among US American girls and young women between 2001 and 2018. All four lines representing suicide, self-poisoning, major depressive episode and depressive symptoms remain below 0 from 2001 to 2012, with z-scores between 0 and minus 1.5. All the lines then trend upwards to show increasing positive values between 2013 and 2018, with final z-scores between 1.5 and 2 in 2017 and 2018.

Table 1. Percentage increase in prevalence rate of different mental health issues since 2010 compared to 2020.

Source: *The Anxious Generation (Haidt, 2024)* (https://www.penguin.co.uk/books/456971/the-anxious-generation-by-haidt-jonathan/9780241647660)[2]

Population	Mental health disorder or issue	Percent increase in prevalence since 2010
US university students	Depression	+106%
US men and women ages 18–25	Anxiety	+139%
US female adolescents ages 10–14	Suicide rate	+167%
US female adolescents ages 10–14	Emergency visits for self-harm	+188%
Nordic nation teen girls	High psychological distress	+76.3%

A recent Gallup poll found that 51% of teenagers in the United States spend at least four hours a day on social media. This means that 51% of teenagers engage in what Haidt and Twenge (2023) (https://tinyurl.com/SocialMediaMentalHealthReview) refer to as 'heavy' social media use. It is at these rates that research indicates a very strong correlation between social media use and decreases in mental health.

Activity

IB learner profile attribute: Reflective/Caring

Approaches to learning: Self-management/Communication

Time required to complete activity: 30 minutes to create, plus administration and analysis time

Activity type: Individual/Pairs

Refining your research skills: Designing a social media survey

Concept application: Measurement

You likely use social media frequently. This activity will ask you to reflect on your own social media use and that of your peers.

Your task is to design a survey with the aim of identifying the use and impact of social media on your classmates.

1. Identify the population and choose a sampling method that you will use to enlist participants.
2. Work independently or in a small group to develop a survey using an online form programme or app, such as Google Forms.
3. Provide a rationale for the inclusion of every survey question.
4. Discuss the inclusion of each question with the class. Reflect on whether you should amend your survey.
5. Your teacher may ask you to conduct the survey.

Reflection questions

1. What did you consider while constructing your survey?
2. How certain can you be that your survey's data will be accurate?
3. Did you take any steps to remove any possible bias during question construction?
4. Consider analysing your data using measures of central tendency, such as the mean, median or mode. Which measure would best fit your data? Why?

Heavy social media is potentially problematic. An analysis by Twenge (2020) (https://prcp.psychiatryonline.org/doi/10.1176/appi.prcp.20190015) of three large surveys of teenagers across two countries found that heavy social media use (at least four hours per day) resulted in almost twice the rate of unhappiness and low well-being than light use (no more than one hour per day).

HL Extension

Culture

Much of the research cited in Haidt, Rausch and Twenge's (https://tinyurl.com/SocialMediaMentalHealthReview) massive literature review investigating the relationship between social media use and mental health is focused on North America and the UK (with some other regions and countries present).

Reflection and application questions

1. Do you think different cultures have different social media usage rates?
2. How might cultural attitudes, beliefs or norms affect social media usage rates?
3. Use a database to identify a study on social media use and its link to a mental health disorder such as depression or anxiety disorder. Share that study with your teacher or a classmate.

This finding was supported by Barthorpe et al. (2020) (https://www.sciencedirect.com/science/article/abs/pii/S0165032720306182), who found that a greater amount of time spent on social media was associated with an increased risk of self-harm and depression, as well as lower levels of self-esteem.

Psychology recognises that environments shape behaviour. Given the consistent correlations found in numerous studies, it's crucial to examine the potential impact of prolonged social media use on behaviour (**Figure 2**).

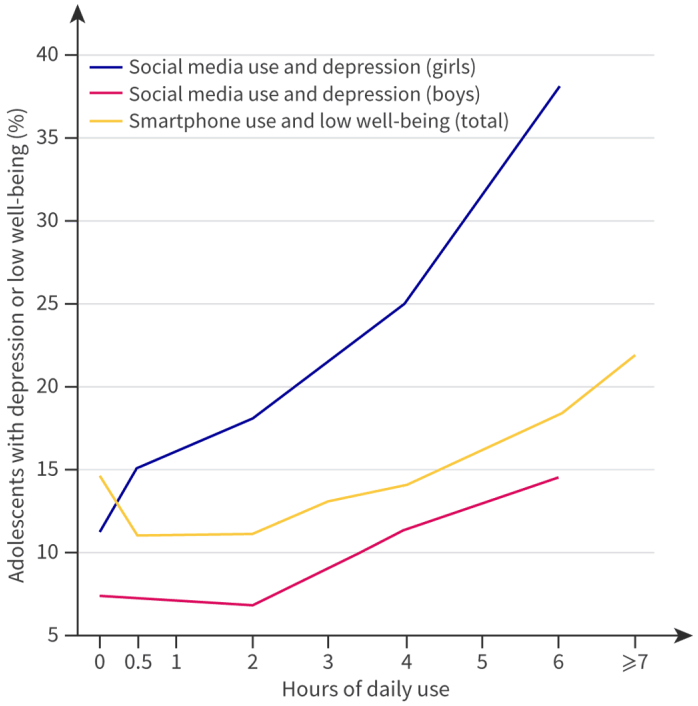


Figure 2. The proportion of adolescents with depression or low psychological well-being, by hours per day of social media or smartphone use.

Source: Data from Twenge (2020) (https://psychiatryonline.org/doi/10.1176/appi.prcp.20190015)[1]

More information for figure 2

Line graph with three lines. Two of the lines relate social media use to depression for boys and girls. They show that depression is positively correlated with daily hours of social media use in girls and boys, and that depression is more common among girls. For girls, the rate of depression is about 11% for 0 hours of social media use and rises to about 38% for 6 hours per day. For boys, the rate of depression is about 7% for 0 to 2 hours of social media, and rises to about 15% for 6 hours of social media per day. The third line on the graph shows the relationship between smartphone use and the rate of low well-being in adolescents. The rate of low well-being is about 15% among adolescents who do not use smartphones, falls to about 11% for adolescents who use smartphones for 0.5 to 2 hours per day, and then rises to about 22% for those who use smartphones for more than 7 hours daily.

Concept

Perspective: Cognitive models

Different perspectives on human cognition and its functioning are referred to as **cognitive models**. It is important to understand at least one cognitive model and how it could be applied to better understand the etiology of depression.

The **dual process model** of thinking and decision-making is one such cognitive model. This model holds that humans share two parallel cognitive systems: System 1 and System 2. System 1 is fast and prediction-based, using previous experiential data to make those predictions. And System 2 is slower and more logically based.

As you work through this section, consider how life experiences could influence System 1 to develop a negative 'autopilot' script about self or the world, and how viewing cognition through the dual process model framework could help in understanding depressive etiology.

Reflection questions

1. Consider the impact of how others treat you on the way you see yourself. Which do you think has the greatest impact on your own self concept: self or others?
2. How might engaging System 2 of the dual process cognitive model help someone to override negative thoughts about themselves or the future?

Why would social media usage reduce psychological well-being?

As you know, correlation does not imply causation. While studies show links between heavy social media use and higher depression rates or lower self-esteem in adolescents, the causal direction is unclear. Depression and low self-esteem might lead to increased social media use, rather than vice versa.

In layperson's terms, this is known as a 'chicken-and-egg paradox.' In psychology, this is referred to as a directionality problem.

Prominent psychologists, Jonathan Haidt (https://jonathanhaidt.com/) and Jean Twenge (https://www.jeantwenge.com/), argue that excessive social media use has unequivocally (without doubt) had negative impacts on adolescent mental health and is a causal factor of depression. Haidt and Twenge's claim about reduced mental health focuses on two key elements:

- social media, not screens, TV, or video games in general.
- 'heavy' use, generally defined as four or more hours daily.

Both researchers feel confident making this claim. This is because the correlational, as well as the true and quasi-experimental, data that exists in the published literature clearly indicate a causal association between heavy social media use (four or more hours per day) and bad mental health outcomes (Haidt, Rausch & Twenge (https://tinyurl.com/SocialMediaMentalHealthReview)).

Haidt and Twenge attribute poor mental health outcomes from heavy social media use to two factors:

- the negative cognitive effects that occur during social media engagement.
- the opportunity cost of time spent on social media, and how this deprives teenagers of potentially more beneficial activities.

Concept

Responsibility

There has been a lot of debate in the news regarding whether or not the government should regulate social media use. The basic argument in favour of regulation is that it is not uncommon for governments to regulate and make laws about things that harm people. Governments in every country make laws regulating what chemicals can be dumped in public water and what the speed limit on a road should be. This is all done to keep people safe.

If heavy social media use is truly harming young people to the extent that Haidt and Twenge believe it is, perhaps governments should limit social media use as well.

In 2018, China took responsibility for the health and well-being of its young people and set strict time limits for video game access. People under 18 are limited to playing online games for only an hour a day and only on Fridays, weekends and public holidays.

Reflection questions

1. Do you believe that governments have a responsibility to restrict and limit access to social media for individuals under the age of 18?
2. If you support limits, what type of limits do you support and why?

Creativity, activity, service

Strand

Service

Learning outcome

- Demonstrate engagement with issues of global significance.

After learning about the link between heavy social media use and negative mental health outcomes, what actions could you take to positively impact your community?

1. Consider the research findings and think about the needs of your community.
2. How might you share these findings in a way that would be effective and meaningful?
3. Is there any action you could take that would help others mitigate their social media use?
4. Is there any action you could take that would help others become aware of the impact of heavy social media use on their own well-being?

Negative cognitive effects

Upward social comparison

Upward social comparison involves individuals comparing themselves with perceived superiors. Samra et al. (2022) (https://akjournals.com/view/journals/2006/11/2/article-p607.xml) linked this behaviour to decreased well-being and increased depression rates. González-Nuevo et al. (2023) (https://link.springer.com/article/10.1007/s11469-021-00711-y) corroborated these findings, showing psychological problems resulting from upward social comparison in a diverse Spanish study group.

Perspective lens

Cognitive and sociocultural approaches

As already discussed in this subtopic, environments can impact a person's neurobiological structures, and therefore environments can contribute to the development of mental health disorders.

However, examining this relationship from a strictly **sociocultural** perspective would leave out a very important component: the individual's **cognitive** processing of that environment.

While environmental risk factors leading to depression are supported by research, it is not appropriate to say that certain environments *cause* depression. Two different individuals placed in the exact same environment may **cognitively** process those same environments differently.

This is why it is crucial that psychologists also examine the etiology of depression from a **cognitive** perspective as well as biological and sociocultural.

Investigations into the impact of social media on mental health must be viewed through both a **cognitive** and **sociocultural** lens. Social media as a technology is clearly an environmental factor. However, the way in which individuals both engage with the technology and process those interactions is very much a **cognitive** act.

Reflection questions

1. When it comes to understanding depressive etiology, do you believe it is possible to separate the cognitive from sociocultural factors? Why or why not?
2. To what extent must investigations into depressive etiology incorporate all three approaches (biological, cognitive and sociocultural)?

Fear of missing out (FOMO)

FOMO, focusing on social comparisons, is the distress caused by believing others are having better experiences. Elhai et al. (2020) (https://www.sciencedirect.com/science/article/abs/pii/S0306460319312420?via%3Dihub) found FOMO to be the strongest predictor of problematic social media use among Chinese university students. Einstein et al. (2023) (https://www.tandfonline.com/doi/full/10.1080/00049530.2023.2217961#abstract) confirmed FOMO's significant impact on anxiety and negative well-being related to extended social media use.

Beck's negative cognitive triad: A cognitive model

During the 1970s, American psychologist Aaron Beck developed a cognitive model based theory of the etiology of depression. He believed that depression resulted from detrimental patterns of thought (**Figure 3**).

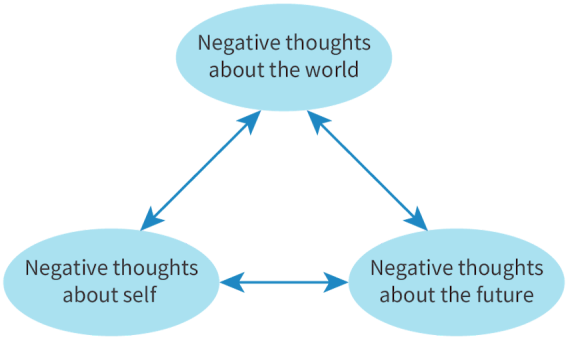


Figure 3. Beck's negative cognitive triad may help to explain the relationship between heavy social media use and the sharp spike in mental health disorders among teenagers.

Beck believed that rumination on these three negative elements results in the development of depression. He believed that the constant and consistent focus on negative outcomes leads to the cognitive factors associated with depression. Research based on modern brain scans has found that individuals with depression do have more active amygdala (https://www.sciencedirect.com/science/article/abs/pii/S0006322302013148) and limbic systems, and this could be explained by constant self-induced worry and anxiety. However, this is of course a slight 'chicken and egg' paradox since it could be the irregular neural network activity within these brain regions that leads to these negative thought patterns. At the time, Beck did not have this technology available to him to either verify the impact of cognition on biology or test the causal direction.

It is important to remember that depression development involves environmental, biological and cognitive factors. Beck's negative cognitive triad remains a valuable framework for understanding the cognitive aspect of depression formation.

Making connections

Cognitive models and mental health disorders

Appreciating the role of cognitive models in understanding mental health disorders is an important learning outcome of this course. Beck's negative cognitive triad is a cognitive model and can be applied to depressive etiology as well as etiology of other mental health disorders.

A key understanding is that the thoughts we engage in can affect not only future thoughts but our neurobiology as well (see **section 2.1.5** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/the-neurobiology-of-mental-health-id-49430/)).

A study by Pössel et al. (2022) (https://www.cambridge.org/core/journals/behavioural-and-cognitive-psychotherapy/article/abs/are-negative-views-of-the-self-world-and-future-mediators-of-the-relationship-between-subjective-social-status-and-depressive-symptoms/A6898C75CF59D177FD4C29F6C913AD6A) examined the relationship between subjective social status and Beck's negative cognitive triad in 243 university students. They found that lower perceived social status correlated with higher negativity across Beck's triad. Additionally, increased negativity in the triad was associated with a higher likelihood of depression.

The dual process model, social media and depression

System 1 within the dual process model of thinking and decision-making utilises life experience and data from the environment to draw conclusions, make predictions and run our 'autopilot' cognitive scripts. Consider the life of a teenager who spends a lot of time online. Think about how System 1 biases such as the availability heuristic, confirmation bias or the Dunning-Kruger effect could impact the way they view the world and themselves in it. How might information that is gained through short form content online and social media posts provide our System 1 (and even System 2) with erroneous or detrimental data?

Activity

IB learner profile attribute: Inquirer/Thinker

Approaches to learning: Thinking/Self-management

Time required to complete activity: 30 minutes

Activity type: Individual/Group

Drawing conclusions and developing psychological theory

Concept application: Causality

Your task is to explain the connection between the research findings in this section.

1. Analyse the relationship between upward social comparison, FOMO and depression, and the findings on social status by Pössel et al. (2022).
2. Explain your analysis of the relationship outlined in question 1 above. While doing so, integrate either Beck's negative cognitive triad or the dual process cognitive model within your explanation. Present your analysis in any form your teacher allows: written, presented, spoken or filmed.

Reflection questions

1. Why might heavy social media use increase FOMO and upward social comparison?
2. Why might FOMO and upward social comparison reduce personal feelings of social status?
3. Why might experiencing consistent FOMO and upward social comparison result in Beck's negative cognitive triad?

An alternative perspective

Haidt and Twenge assert that substantial evidence supports a causal link between heavy social media use and declining mental health. However, they acknowledge the existence of valid studies and arguments that challenge their claim.

Orben and Przybylski (2019) (https://doi.org/10.1038/s41562-018-0506-1) analysed over 300 000 survey responses to examine the effects of digital technology on adolescents. They found no statistically significant causal relationship between technology use and negative mental health outcomes. Their study concluded that technology use accounts for, at most, 0.4% of well-being variation.

Orben and Przybylski's analysis critiqued research on technology use and mental health outcomes. They highlighted the lack of standardised definitions for key terms like 'technology use,' 'well-being' and 'depression.'[3] This inconsistency in terminology allows researchers too much freedom in defining these concepts, potentially affecting study results and comparability.

Making connections

Validity

The critique by Orben and Przybylski (2019) is important to consider, not only in the context of technology use and the etiology of mental health disorders, but in all research contexts.

As discussed in **subtopic 1.1** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/big-picture-id-49350/), researchers have a great deal of control over the data they collect, how they sort that data and the statistical tools they use to analyse it. Each of these choices can be made in a way that could affect the validity of the results.

In this case, Orben and Przybylski (2019) believe that much of the existing research on social media use and well-being has reduced validity due to the freedom of researcher choices.

Twenge, Hadit and two other colleagues wrote a response to Orben and Przybylski's (O&P) publication in the journal *Nature*. Twenge et al. (2019) (https://www.nature.com/articles/s41562-020-0839-4.epdf?author_access_token=AMli-v_NVizlRHfiHJUs2NRgN0jAjWel9jnR3ZoTv0NyO6WHXhaam3zaljiEGjfZWSw5xRcCYPYjudNb4RKEc1H5eAeNLyrwNMcZ3
concluded that O&P had made six analytical choices that resulted in lower effect sizes than the data would yield otherwise.

They criticised O&P for including all screen time rather than focusing specifically on social media, which Twenge et al. consider the problematic technology.

Learning outcomes

By the end of this section, you should be able to:

- Identify and analyse factors impacting the prevalence of health problems in populations.
- Discuss the extent to which governments have a responsibility to take action against societal elements that reduce well-being.
- Explain the role and use of cognitive models in understanding mental health disorders.

HL Extension

- Discuss the role of technology on mental health problems.
- Discuss the role of social media in contributing to group behaviour.

- Describe the effect of technology on cognition.

[1] Twenge, J.M. (2020) (https://doi.org/10.1176/appi.prcp.20190015) 'Increases in Depression, Self-Harm, and Suicide Among U.S. Adolescents After 2012 and Links to Technology Use: Possible Mechanisms,' *Psychiatric Research and Clinical Practice*, Volume 2. Licenced under the CC-BY-4.0 licence https://creativecommons.org/licenses/by/4.0/ (https://creativecommons.org/licenses/by/4.0/)

[2] Haidt (2024) (https://www.penguin.co.uk/books/456971/the-anxious-generation-by-haidt-jonathan/9780241647660) *The Anxious Generation*, Allen Lane, an imprint of Penguin

[3] Orben, A., Przybylski, A.K. (2019) (https://doi.org/10.1038/s41562-018-0506-1) 'The association between adolescent well-being and digital technology use,' *Nature Human Behaviour*, Volume 3, Pages 173–182, © Nature

2.1 Mental health disorders

What is the relationship between neurobiology and mental health?

Guiding question(s)

In this subtopic, you are thinking about the question, '**To what extent are mental health disorders a function of biology?**' This section will help you make an informed response by working through the following guiding question:

- What evidence exists linking depressive etiology to neurotransmitter or neural network dysfunction?

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

The only thing in existence more complicated than the human brain is existence itself.

Around 86 billion neurons in the human brain interact to create over 100 trillion connections. Those 100 trillion connections (https://www.scientificamerican.com/article/100-trillion-connections/) result in the amazingness and complexity that is you.

Scientific understanding of the human brain has advanced dramatically over the past 50 years. The brain, as part of the central nervous system, is crucial to the human experience. It coordinates vital bodily functions while generating consciousness, allowing us to both sustain and experience life.

Technologies such as PET, MRI and fMRI (http://www.nature.com/news/human-brain-mapped-in-unprecedented-detail-1.20285) have enhanced our understanding of brain anatomy and physiology, improving treatments for brain-based disorders. Biological explanations for depression gained prominence with the rise of antidepressants, such as Prozac®[1] (fluoxetine), in the late 1980s. Since then, genomic sequencing and improved brain imaging have allowed for a more nuanced understanding of depression's biological factors.

Neurotransmitters, neurotransmission

The brain's 100 trillion connections are enabled by neurotransmitters. Neurotransmitters are chemical messengers, and the message they send to neurons is either 'turn on' or 'turn off.'

The total number of neurotransmitters in the human brain remains unknown, but there are definitely more than 100 different ones (*Neuroscience*, 2001 (http://www.ncbi.nlm.nih.gov/books/NBK10795/)), including serotonin, dopamine and acetylcholine. Some nerve cells contain more than one type of neurotransmitter.

Neurotransmission is the process of an electrical impulse travelling down the axon (body) of the neuron. When it reaches an axonal terminal, a neurotransmitter is released that then crosses the synapse (gap) to the next neuron (**Figure 1**). Neurotransmitters are stored in a neuron's terminal buttons. After crossing the synapse, the neurotransmitter fits into receptor sites on the postsynaptic cell, like a key in a lock.

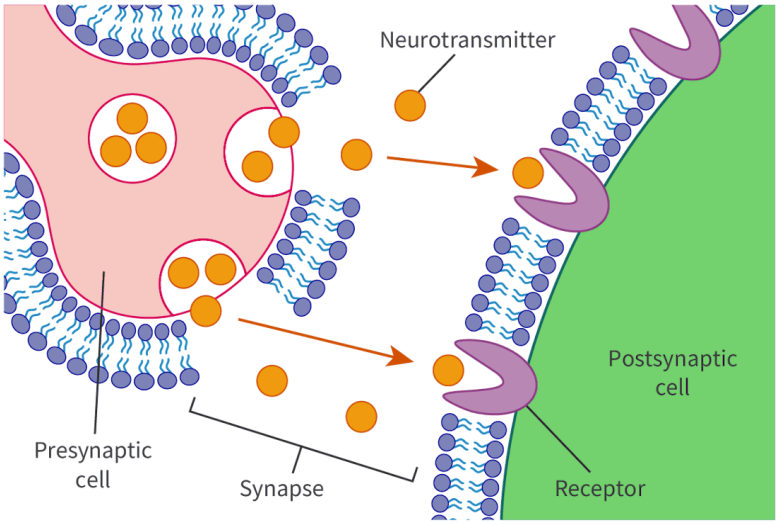
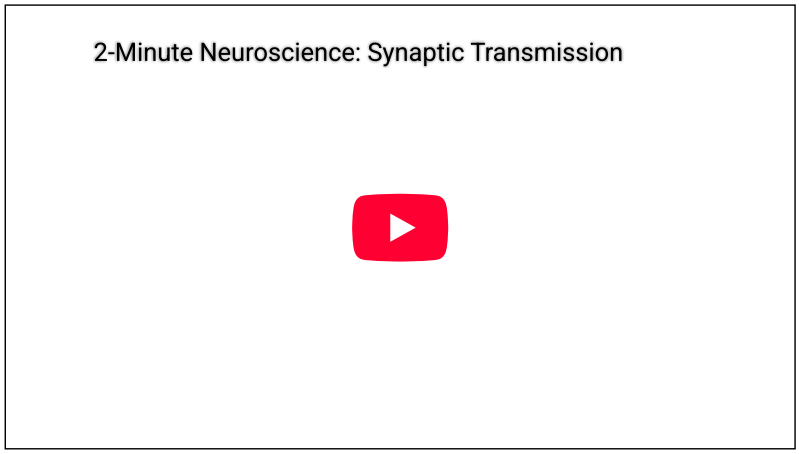


Figure 1. Neurotransmission, showing a close-up of the synapse between two neurons.

More information for figure 1

Neurotransmitters are depicted as small particles which originate inside the presynaptic cell. They are released from the cell into the synapse, which is depicted as an empty space between the presynaptic cell and the postsynaptic cell. The neurotransmitters cross the synapse and attach themselves to receptors on the outside of the postsynaptic cell.

After a neurotransmitter has signalled an electrical impulse in the postsynaptic cell, the neurotransmitter molecules are 'cleaned up' by transporter molecules released by the presynaptic neuron. This process is referred to as reuptake, and they are reabsorbed, re-entering the presynaptic cell to be reused. Not all neurotransmitters are cleared from the synaptic gap via reuptake. In some cases, neurotransmitters are broken down. This breaking down of neurotransmitters is known as degradation. Watch **Video 1** to see a summary of neurotransmission at the synapse.



Video 1. Neurotransmission at the synaptic gap.

Checklist

Learning outcomes

By the end of **subtopic 2.1**, you should be able to:

- Describe the value of using one or more brain imaging techniques in investigating human behaviour.
- Describe factors contributing to variations in prevalence rates of mental health disorders across different cultures and populations.
- Examine cultural differences in approaches to mental health, citing specific examples to illustrate diverse perspectives.
- Evaluate one or more systems of measurement used to determine psychological wellness or dysfunction.
- Discuss how bias may affect the validity or reliability of a psychological diagnosis.
- Identify the role of environmental factors on mental health disorders.
- Discuss the interaction of environmental factors and genetics in human behaviour.
- Explain the role and use of cognitive models in understanding mental health disorders.
- Discuss the extent to which one can say that social environments cause depression or some other psychological disorder.
- Discuss the extent to which governments have a responsibility to take action against societal elements that reduce well-being.
- Identify and analyse factors impacting the prevalence of health problems in populations.
- Describe one or more biological explanations for a specific mental health disorder.
- Explain the process of neurotransmission and how an understanding of it allows psychologists to improve health and well-being.
- Describe the role of one or more chemical messengers in human behaviour.
- Evaluate the role of localisation of function in explaining human behaviour and cognition.
- Identify limitations of the argument that behaviour is localised.
- Discuss the strengths and limitations of a reductionist approach to the study of behaviour.
- Discuss the extent to which neurotransmitter dysfunction could be said to cause depression.
- Discuss the extent to which human behaviour may be inherited.

HL Extension

- Discuss the role of technology in assisting in the prevention or treatment of health problems.
- Discuss the role of culture in diagnosing and treating mental health issues.
- Discuss cross-cultural comparisons of the prevalence of mental health issues.
- Discuss the role of technology on mental health problems.
- Discuss the role of social media in contributing to group behaviour.
- Describe the effect of technology on cognition.

Overview
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Student
view

There are two important things to understand about neurotransmitters:

- Neurotransmitters can either activate ('turn on') or deactivate ('turn off') a neuron/neural network.
  - Neurotransmitters that activate a neural network are called excitatory. An example of an excitatory neurotransmitter is glutamate.
  - Neurotransmitters that deactivate a neural network are called inhibitory. An example of an inhibitory neurotransmitter is GABA.
- Neurotransmitters do not cause a given behaviour – neural networks do.
  - Many students misunderstand this and believe that 'dopamine causes feelings of pleasure' or 'serotonin increases energy levels and mood.' This is not true. Both dopamine and serotonin are associated with many behaviours because they both are present in a variety of brain regions and, therefore, excite or inhibit a variety of neural networks. For this reason, they are associated with various behaviours, such as mood, energy, motivation, body movement, sleep and perception.

Making connections

Health and well-being

Many drugs of abuse, such as those derived from opiates, mimic dopamine in the brain. They can bind to dopamine receptors in specific brain regions, resulting in over-activation or sustained deactivation of neural networks.

Other drugs of abuse work by blocking the reuptake of the neurotransmitter (dopamine or serotonin in most cases). This increases the presence of the neurotransmitter in the synaptic gap. In turn, the neuron and neural network are over-activated or deactivated for a sustained period of time.

Frequent use of drugs of abuse can result in the body reducing the amount of a neurotransmitter produced while trying to maintain homeostasis (equilibrium) and the false indication that the neurotransmitter is in surplus.

The serotonin hypothesis

You may be familiar with the neurotransmitter serotonin because of its association with depression and the most common biologically based treatment for depression – selective serotonin reuptake inhibitors (SSRIs).

The serotonin hypothesis of depression, popular since the 1970s, led to the development of SSRIs like Prozac. Since then, millions of people worldwide have been prescribed some type of SSRI. However, recent research challenges this theory. The problem is that these drugs don't actually work any better than a placebo (Kirsch, 2014 (https://econtent.hogrefe.com/doi/10.1027/2151-2604/a000176)).

Irving Kirsch used meta-analyses to suggest SSRIs are no more effective than placebos: 'the serotonin theory of depressive etiology is as close to any theory in the history of science to be proved wrong'[2] (Kirsch, 2014 (https://doi.org/10.1027/2151-2604/a000176)). This strong sentiment is echoed by Philip Cowen who, in a review of the relationship between serotonin and depression, wrote, 'simple biochemical theories that link low levels of serotonin with depressed mood are no longer tenable [justifiable]'[3] (Cowen and Browning, 2015 (https://onlinelibrary.wiley.com/doi/10.1002/wps.20229)).

These claims are further supported by the fact that tianeptine, a selective serotonin reuptake enhancer (meaning the drug *decreases* the amount of serotonin in the brain), has been repeatedly shown to reduce depressive symptoms (Wagstaff, et al. 2012 (https://link.springer.com/article/10.2165/00023210-200115030-00006)). Clearly, if a lack of serotonin is the true neurobiological cause of depression, reducing it would make symptoms worse not better.

Thus, the neurotransmitter serotonin may be involved in depressive etiology in some way but the mechanisms of that involvement are far from clear.

Concept

Change

The psychological community's understanding regarding the neurobiological correlates of depression has undergone a great deal of change over the past 50 years.
What was once a limited view focused on a single neurotransmitter has expanded to include complex neural networks.

Reflection questions

- Discuss how the psychological community's understanding of the neurobiology of depression has changed over time.

Neural network dysfunction

If serotonin deficiency is not the neurobiological cause of depression, what is?

The most recent scholarship is focused on using brain scan technologies such as PET, fMRI, and MRI to identify and understand possible abnormalities in neural networks.

The research has identified (https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(15)00579-9/abstract) a variety of neural networks that could explain the neurobiological cause of depression, such as:

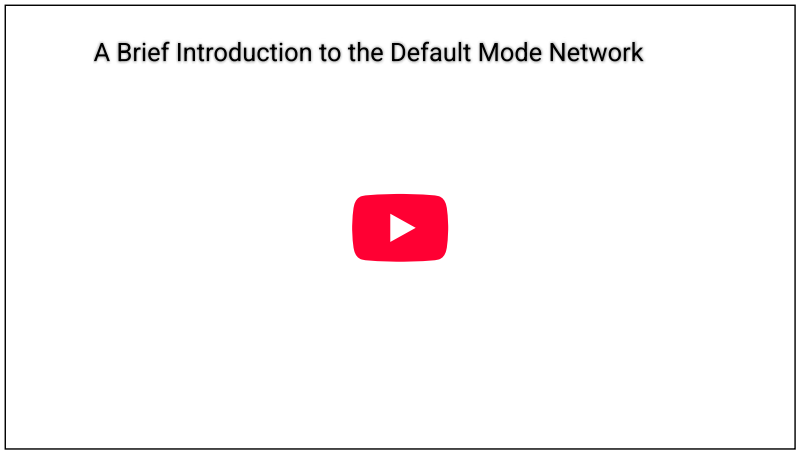
- the central executive network (CEN) (https://www.nature.com/articles/s41380-022-01899-8): a brain network that consists of the prefrontal cortex (https://neuroscientificallychallenged.com/posts/know-your-brain-prefrontal-cortex#:~:text=The%20prefrontal%20cortex%20is%20the,be%20divided%20into%20severa as well as networks within the parietal lobe

(https://www.spinalcord.com/parietal-lobe#:~:text=The%20parietal%20lobe%20is%20vital,other%20areas%20of%20the%20bod

- the salience network (SN) (https://www.sciencedirect.com/science/article/abs/pii/S0149763417303275): a network of nodes in the amygdala, anterior cingulate and insular.
- the limbic system (https://qbi.uq.edu.au/brain/brain-anatomy/limbic-system): primarily the amygdala and hippocampus but also includes the basal ganglia and hypothalamus.

However, most scholarship has focused on the default mode network (DMN) (https://www.sciencedirect.com/topics/neuroscience/default-mode-network#:~:text=Brain%20regions%20that%20are%20more,cingulate%20cortex%2C%20and%20angular%20gyru a brain network that is most active when humans are at cognitive rest (our default conscious state). This network consists of a variety of brain regions, most notably the medial prefrontal cortex (https://www.sciencedirect.com/topics/medicine-and-dentistry/medial-prefrontal-cortex), the cingulate cortex (https://www.sciencedirect.com/topics/neuroscience/cingulate-cortex#:~:text=The%20cingulate%20cortex%20is%20an,predominantly%20implicated%20in%20pain%20process and the angular gyrus (https://journals.sagepub.com/doi/10.1177/1073858412440596). Watch **Video 2** to see the functional connectivity patterns of the DMN.

Doucet et al. (2020) (https://www.cambridge.org/core/journals/european-psychiatry/article/transdiagnostic-and-diseasespecific-abnormalities-in-the-defaultmode-network-hubs-in-psychiatric-disorders-a-metaanalysis-of-restingstate-functional-imaging-studies/660033F6D3053821874600E4798B8D0E) compared fMRI images of 2,789 individuals with depression, anxiety, and schizophrenic disorders to 3,000 healthy controls. They found consistent DMN dysconnectivity in those with mental health disorders. This finding is supported by Brakowski et al. (2017) (https://www.sciencedirect.com/science/article/abs/pii/S002239561630752X?via%3Dihub) who found there is a significant link between depression and connective irregularities of the DMN.



Video 2. The default mode network.

Psychologists theorise that an overactive or malfunctioning DMN contributes to rumination and misprocessing of emotional stimuli. This theory is supported by the effectiveness of cognitive therapy in reducing rumination. Modern biological treatments such as ketamine (https://www.sciencedirect.com/science/article/pii/S2213158219300890?via%3Dihub) and psilocybin (https://academic.oup.com/ijnp/article/26/3/155/6770039) have been shown to

produce an incredibly quick and sustained reduction of depressive symptoms. Researchers believe that these positive effects are likely due to the fact that both drugs encourage the development of new neurons (neurogenesis) and, therefore, change connectivity within the DMN.

Activity

IB learner profile attribute: Thinker/Knowledgeable

Approaches to learning: Thinking

Time required to complete activity: 30 minutes

Activity type: Individual

Understanding localisation of brain function

You have been examining biological theories of depressive etiology. The idea that a complex behaviour such as depression can be mapped onto a set of neurochemical interactions in a specific brain region demonstrates the framework of 'localisation.'

Localisation is a lens through which scientists seek to identify the neurobiological origin of a behaviour. In simpler terms, scientists attempt to figure out where certain behaviours 'live' in the brain.

Your task is to evaluate the strengths and limitations of this approach to understanding human behaviour.

1. Identify three elements from society and analyse them using a reductionist 'localisation' lens. For example, what makes a car move? (Where is the locomotion of a car localised? The engine? Or is it the pistons? Of course, a car could not move without wheels...)
2. Create a T-chart in which you broadly state the strengths (left column) and limitations (right column) of a localised reductionist approach to analysing phenomena.

Reflection questions

1. How does the phrase 'the whole is greater than the sum of its parts' relate to the concept of localisation?
2. **(Concept application: perspective)** For your chosen analysis, do you believe anything is 'lost' in reducing behaviour to a strictly biological perspective?
3. What knowledge can be gained by aligning a given behaviour with a localised brain region or neural network? What are the advantages of having a knowledge of localised brain function?

Reductionism and neurobiological explanations

Thomas Insel, former NIMH director, asserts that all mental health disorders are brain disorders (https://doi.org/10.1126/science.aab2358), reflecting a reductionist perspective. While this view accurately links thoughts and behaviour to the brain, it overlooks environmental and cognitive factors influencing brain development and function. Research shows that chronic stress, trauma, and negative thought patterns can contribute to depression (see **section 2.1.3** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/can-society-cause-mental-health-disorders-id-49428/)), even though the exact neurobiological mechanisms remain unclear. However, new insights into network-based biology have led to the development of effective treatments, reducing the prevalence of depression and anxiety (see **section 2.2.4**

(https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/which-biological-treatments-for-depression-are-the-most-effective-id-49442/)).

Learning outcomes

By the end of this section, you should be able to:

- Describe one or more biological explanations for a specific mental health disorder.
- Explain the process of neurotransmission and how an understanding of it allows psychologists to improve health and well-being.
- Describe the role of one or more chemical messengers in human behaviour.
- Describe the value of using one or more brain imaging techniques in investigating human behaviour.
- Evaluate the role of localisation of function in explaining human behaviour and cognition.
- Identify limitations of the argument that behaviour is localised.
- Discuss the strengths and limitations of a reductionist approach to the study of behaviour.
- Discuss the extent to which neurotransmitter dysfunction could be said to cause depression.

[1] Prozac is a registered trademark of Eli Lilly and Company

[2] Kirsch, I. (2014) (https://doi.org/10.1027/2151-2604/a000176) 'Antidepressants and the Placebo Effect,' *Zeitschrift für Psychologie*, Volume 222, Pages 128–134, © 2015 Hogrefe Publishing.

[3] Cowen and Browning (2015) (https://doi.org/10.1002/wps.20229) 'What has serotonin to do with depression?' *World Psychiatry*, Volume 14, Pages 158–160, © Wylie.

What is the relationship between genetics and mental health?

Guiding question(s)

In this subtopic, you are thinking about '**To what extent are mental health disorders a function of biology?**' This section will help you make an informed response by working through the following guiding question:

- What evidence exists supporting the claim that depression is heritable?

Keep the guiding question in mind as you progress through this section. The guiding questions build into the subtopic question(s). You will return to the subtopic question(s) at the end of each subtopic. The subtopic questions require you to pull together your knowledge and skills from different sections, to see the bigger picture and to build your conceptual understanding.

From a reductionist perspective, mental health disorders are considered brain disorders. This view prompts an investigation into genetic explanations for these conditions. The reasoning suggests that if mental health disorders stem from neurological dysfunction, and our neurology is initially shaped by our genes (**Figure 1**), there may be a genetic basis for depression and other mental health disorders.

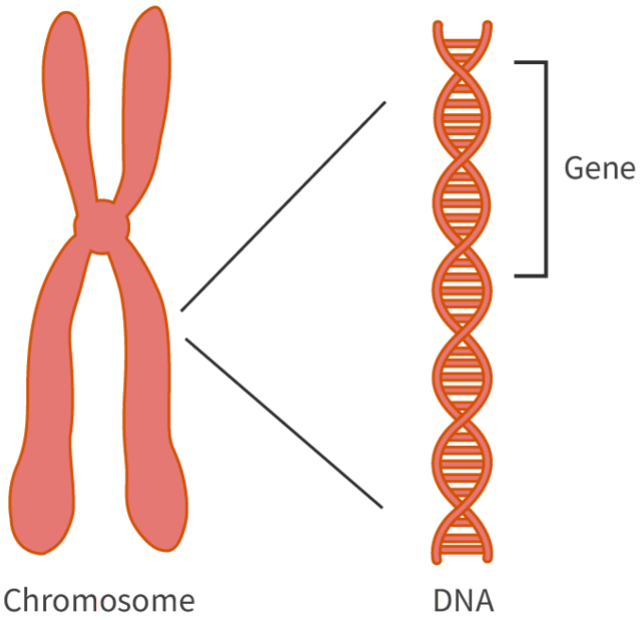


Figure 1. A gene is a section of DNA that contains information necessary to specify physical traits.

The 5-HTT serotonin transporter gene and depressive etiology

In 2003, Avshalom Caspi and a team of researchers investigated correlations between depression, genetic predispositions and environmental stressors. The specific genetic predisposition they investigated is sometimes known as 'the serotonin gene,' but it is more accurately referred to as the 5-HTT serotonin transporter gene, which has two forms:

- The short allele of the gene.
- The long allele of the gene.

Caspi et al. (2003) (http://science.sciencemag.org/content/301/5631/386) theorised that depression might be caused by genetic predispositions related to the serotonin transporter gene (5-HTT) in combination with environmental stressors. The following outlines the details of the study:

- The method was a quasi-experiment/correlational study.
- The sample included 847 participants from New Zealand.
- The participants were divided into two groups, one with the shorter allele of the serotonin transporter gene and the other

without.

- Participants then completed an inventory of major stressful life events over the past 5 years (relationships, employment, health, etc.) in a questionnaire.
- Incidence of depression in each participant was assessed through a structured interview.

The results indicated that there was no statistically significant relationship between the serotonin transporter gene and depressive episodes when life stress was low. However, the number of depressive episodes was much higher in participants with the short 5-HTT variant when the number of stressful life events was higher (**Figure 2**).

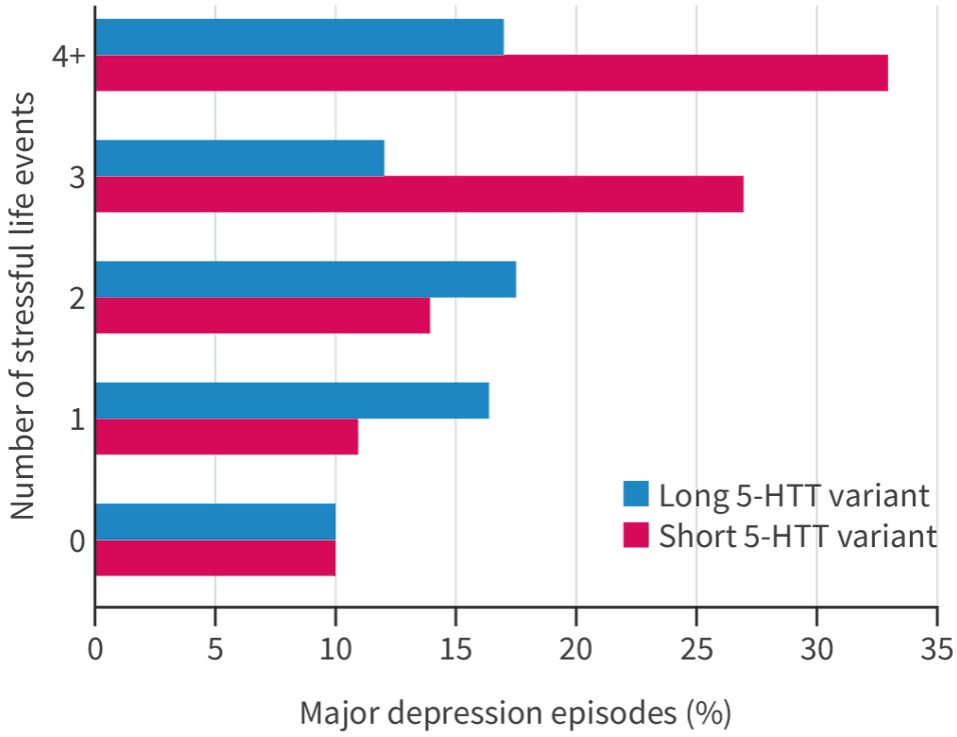


Figure 2. The short variant of 5-HTT was linked to depression.

Source: Data from Caspi et al. (2003) (https://www.science.org/doi/10.1126/science.1083968)[1]

More information for figure 2

Bar chart plotting prevalence of major depressive episodes against number of stressful life events experienced by people with the long 5-HTT variant and the short 5-HTT variant. Number of stressful life events ranges from 0 to 4 plus. Prevalence of depressive episodes is expressed as a percentage, ranging from 10% to over 30%. For people with either gene variant who experienced 0 stressful life events, the rate of

major depressive episodes is 10%. For 1 or 2 stressful events, people with the long 5-HTT variant experienced higher rates of depression at about 17 to 18%, compared to people with the short variant at about 11 to 14%. For 3 or 4 plus stressful life events, rates of depression remained similar for people with the long variant, at about 12% and 17%. However, people with the short variant experienced more depressive episodes than all other groups, at rates of about 27% and 33%.

The study of the 5-HTT serotonin transporter gene is often misinterpreted as emphasising genetics in depression. However, a closer analysis reveals the environment's significant role. Participants with the short allele of the 5-HTT gene were more susceptible to depression only when experiencing three or more major stressful life events. Surprisingly, those with the short allele had lower depression rates than long-allele carriers when experiencing fewer stressful events, highlighting the complex interplay between genetics and environment in depression.

Caspi et al. (2003) concluded that while genetics may play a role in the development of depression, a more precise description of the observed effects in their study would be that of a gene–environment interaction. This fits the framework of the diathesis–stress model of depressive etiology (see **section 2.1.3** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/can-society-cause-mental-health-disorders-id-49428/)).

Chiao and Blizinsky (https://royalsocietypublishing.org/doi/10.1098/rspb.2009.1650) (2009) expanded on Caspi et al.'s (2003) work by examining the prevalence of the 5-HTT gene's short allele across various countries and cultures. They discovered that countries with higher rates of the short allele paradoxically had lower depression rates if they had collectivist cultures. This finding suggests that environmental factors, particularly cultural context, may play a more significant role in depression etiology than genetics. The researchers hypothesised that collectivist cultures might mitigate genetic risk factors for depression.

The 5-HTT serotonin transporter gene was the focus of Neumeister et al. in their 2002 study (https://jamanetwork.com/journals/jamapsychiatry/fullarticle/206543). Their aim was to investigate the relationship between the short allele of the gene and serotonin depletion. Neumeister et al. (2002) conducted a double-blind, placebo-controlled trial with 24 participants. By reducing tryptophan, an amino acid precursor to serotonin, the researchers aimed to determine whether short allele carriers were more susceptible to depression-like symptoms when serotonin levels were lowered.

Neumeister et al.'s (2002) study confirmed their hypothesis: individuals with the 5-HTT gene's short allele experienced significant depressive symptoms during tryptophan depletion. Conversely, those with the long allele genotype did not develop depressive symptoms, regardless of family history. These findings provide further evidence for genetic risk factors in depression, though the extent of their influence remains a key question.

In 2015, Polderman et al. (2015) (https://www.nature.com/articles/ng.3285) published one of the largest twin studies in the history of scientific research. The aim of the research was to understand the extent to which a variety of traits, including depression, are heritable. To achieve this, they conducted a massive meta-analysis on 2,748 publications containing data on over 14 million twin pairs!

The researchers investigated several traits such as height, personality, IQ score and depression. They concluded that depression had an estimated heritability of 36%. This means that 36% of that variance can be explained by genetic factors. In other words, 64% of the variance in depression among individuals is due to non-genetic factors.

The heritability estimate of 36% is not insignificant. However, it is low considering that the heritability estimate of personality was 50%, height 78%, and high-level cognitive functioning 82%.

Concept

Causality

Psychologists and psychological researchers inevitably seek causal clarity. However, there are many situations in psychology in which definitive causal answers are not yet possible.

Reflection questions

- To what extent could genetics be said to cause depression?
- How might Karl Popper's approach to falsification (see **section 1.1.1** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/psychology-as-a-science-id-49351/)) be useful in psychological research given the complexity of human behaviour?

Fernandez-Pujals et al. (2015) (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0142197) investigated the heritability of major depressive disorder (MDD) using a twin sample. Their initial estimate of 35% aligned with

previous studies. However, after controlling for environmental factors like education, income, marital status, and alcohol use, the heritability estimate decreased to 28%. The researchers suggested this lower figure is likely to be more accurate, as twin studies often overestimate heritability due to difficulties in controlling for environmental factors.

Activity

IB learner profile attribute: Thinker/Knowledgeable

Approaches to learning: Thinking

Time required to complete activity: 20 minutes

Activity type: Individual/Group

Exploring epigenetics

Epigenetics describes the ability for external stimuli in the environment to create a change in the expression of a gene. In short, it is the ability for environmental stimuli to either 'turn on' or 'turn off' a gene.

One of the most compelling observations of epigenetics in research is that of the agouti gene in mice populations. The agouti gene is dominant, so mother mice who possess it will pass it to their offspring. The gene causes a mouse to have yellow fur and be obese. This is very detrimental to the survival of a mouse. Researchers have found that this gene can be 'turned off' if the mother consumes a methyl-rich diet.

Visit the University of Utah's website (https://learn.genetics.utah.edu/content/epigenetics/nutrition/) and answer the reflection questions.

Reflection questions

1. **(Concept application: change)** How might understanding the impact of diet on epigenetics influence psychological approaches to treating mental health disorders?
2. In what ways can the transgenerational effects of nutrition inform our understanding of inherited psychological traits and behaviours?
3. How could public health policies incorporate findings from epigenetic research to improve mental health outcomes on a societal level?

A gene—environment interaction

Research has not identified a single 'depression gene.' Instead, depression likely results from a gene–environment interaction, exemplifying the diathesis–stress model of depressive etiology (see **section 2.1.3** (https://app.kognity.com/study/app/psychology-new/sid-540-cid-763690/book/can-society-cause-mental-health-disorders-id-49428/)). While the exact genetic and neurobiological mechanisms are complex and possibly epigenetic, studies indicate that genetics play a role in depression development. Certain genes, like the short allele of the 5-HTT serotonin transporter gene, may create a genetic vulnerability to depression when combined with sustained environmental triggers, such as severe or consistent stress.

Learning outcomes

By the end of this section, you should be able to:

- Discuss the extent to which neurotransmitter dysfunction could be said to cause depression.
- Discuss the extent to which human behaviour may be inherited.
- Discuss the strengths and limitations of a reductionist approach to the study of behaviour.
- Describe one or more biological explanations for a specific mental health disorder.

HL Extension

- Discuss cross-cultural comparisons of the prevalence of mental health issues.

[1] Caspi, A. et al. (2003) (https://doi.org/10.1126/science.1083968) 'Influence of Life Stress on Depression: Moderation by a Polymorphism in the 5-HTT Gene,' *Science*, Volume 301, Pages 386–389, © American Association for the Advancement of Science.

Activity sheet: What factors contribute to depressive etiology?

This activity sheet will guide you through activities of increasing complexity, all in the interest of refining your understanding of depressive etiology.

Subtopic question(s)

During this activity sheet, you will be working towards answering the following subtopic question:

- To what extent are mental health disorders a function of biology?

Part A

Knowledge and understanding

Depressive etiology

The following questions test your knowledge and understanding of depressive etiology.

Which theory of depressive etiology puts forward the hypothesis that cognitive triggers from the environment interact with a biological vulnerability to create a mental health disorder?

1. Diathesis—stress model
2. Etiology
3. Social identity theory
4. Vulnerability theory

Modern biological treatments for depression, such as ketamine and psilocybin, have been shown to impact the development and growth of new neurons in key brain regions associated with mental well-being. What is the name for the brain's

ability to change in response to biochemical or environmental stimuli?

Type here

_____ investigated the relationship between the 5-HTT serotonin transporter gene, adverse stressful life events and depression.

Jonathan Haidt and Jean _____ believe that social media use has a _____ effect on the well-being of adolescents and teenagers, and explains the sharp rise in mental health disorders among this population.

Part B

Application and analysis

Applying research

Your task is to use the PubMed (http://pubmed.gov/) online database to identify the findings of two research studies that would support Haidt and Twenge's claim (https://www.newyorker.com/news/the-new-yorker-interview/jonathan-haidt-wants-you-to-take-away-your-kids-phone) that social media use has increased the prevalence rate of mood and anxiety disorders, such as depression, around the world.

When using a large online database such as PubMed.gov or Google Scholar, be precise in your search terms, and use the filters provided to help you narrow down your results. For example, some key terms that will help find supporting evidence for Haidt and Twenge's findings are:

- social media
- teen
- adolescent
- depression
- anxiety.

You can combine the above terms and use quotation marks ("social media") to ensure that these terms remain in your search results. Have fun!

In your response, you should:

1. Identify and summarise the findings of two distinct pieces of research.
2. Write three to six sentences applying each piece of research in support of Haidt and Twenge's claims (https://www.newyorker.com/news/the-new-yorker-interview/jonathan-haidt-wants-you-to-take-away-your-kids-phone).

Identify the findings of two research studies that would support Haidt and Twenge's claim that social media use has increased the prevalence rate of mood and anxiety disorders, such as depression, around the world.

Your answer

0/2000

Applying skills and analysing data

Consider the following data presented in the global map of prevalence rates of depression, linked here (https://ourworldindata.org/grapher/depressive-disorders-prevalence-ihme) (Our World in Data).

Given that human biology changes at an incredibly slow pace (over thousands of years or more), what could explain the difference in prevalence rates?

Your answer

0/2000

Press ‘play’ on the map and focus on a specific country or region as you watch the animation. What might explain the changing prevalence rates over time?

Your answer

0/2000

Find the country you live in and compare its prevalence rate with that of another country you have lived in, visited or are curious about. What might explain the differences?

Your answer

0/2000

Part C

Synthesis and evaluation of depressive etiology

Discuss the extent to which depression could be said to be caused by biological factors. Be sure to cite research in support of your response.

Your answer

0/2000

Reflection

Discuss the extent to which depression could be said to be caused by environmental factors, such as stress, social media use or both. Be sure to cite research in support of your response.

Your answer

0/2000

Summary

After completing these activities, you should have a greater understanding of the strengths and limitations of the theoretical role of biological factors in depressive etiology.