

Reading Passage 2

You should spend about 20 minutes on **Questions 14-26**, which are based on Reading Passage 2.

DEPRESSION MAY REDUCE THE AMOUNT OF WHITE MATTER IN THE BRAIN

- A. Your brain looks different if you have depression, a common and serious medical illness that negatively affects how you feel, the way you think and how you act... But many of the differences seem to be caused by depression, rather than precede it. When neuroscientists compare the brains of people with and without depression, there are common dissimilarities. For example, people with depression tend to have a smaller hippocampus, a brain region important in forming memories. But it has been difficult to work out whether such differences cause the symptoms of depression or whether they result from the disorder, says Heather Whalley at the University of Edinburgh, UK. "We don't know which causes which."
- B. To answer the question, Whalley and her colleagues turned to two huge genetic databases. Consumer genetic testing company 23andMe holds information on the DNA and depressive symptoms of tens of thousands of individuals, and the UK Biobank collects DNA, lifestyle and behaviour questionnaires and brain scans from thousands more. Whalley and her colleagues used this data, as well as already-published research, to create what is known as a polygenic risk score (PRS) for depression. A PRS assigns weight to various genetic factors that are thought to contribute to the risk of a condition. They made sure their PRS worked by testing it in a separate sample of 11,214 people. The team then assessed the brain scans and behaviour records of those individuals with a PRS that put them at a genetic risk of depression. They found that people with higher genetic risk scores tended to have less white matter in their brains, and that it didn't seem to be functioning as well.
- C. Whalley and her team then used a statistical analysis to work out whether these white matter differences were causing the depression or resulting from it. The analysis takes into account brain structure and depression symptoms, and looks at how closely each are related to genetic factors. Genes are present from birth, so if genetic factors are more closely linked to symptoms, for example, that suggests that the symptoms were present before the brain structure differences. The team found that many brain

differences appear to be caused by depression. But differences in a region of the brain called the anterior thalamic radiation appear to come before depression. This suggests that the genes that put a person at risk of depression do so via this particular brain network. "It does make sense," says Whalley. "It's the main relay centre... for information going to and from the brain."

- D. Depression symptoms and behaviours could end up impacting the brain's white matter connections more generally, says Maxime Taquet at the University of Oxford, who wasn't involved in the study. "It might be that patients with depression... do not use some of the brain connections that other people would use," he says. Being socially withdrawn, or focusing more on the negative than the positive, could have an effect, he says. "We know that if we don't use a pathway in the brain, that pathway starts to shrink."
- E. Whalley's team also found a host of lifestyle factors and experiences that seem to be linked to depression. They found that a combination of childhood trauma and poverty put individuals at the greatest risk of depression. While childhood trauma was a risk factor in causing depression, trauma in adulthood wasn't. Experiencing high levels of stress at a young age can disrupt a person's stress coping mechanisms for life, says Whalley. "It might mean that you'll need a smaller trigger to have a much more stressful response," she says.
- F. Child abuse or poverty can also alter which genes are active in the developing brain through a process called epigenesis. These changes can lead to diseases such as schizophrenia and bipolar disorder. "Childhood maltreatment is like a surgical strike on the brain," says Carmine Pariante, who studies the effects of stress on child development at the Institute of Psychiatry, King's College London. "This explains why these individuals are at risk of developing a host of stress-related disorders later in life – because they have an impaired ability to cope with stress."
- G. "Findings like this indicate that maltreatment can leave damage hidden deep inside the body that persists for many years," says Terrie Moffitt of Duke University in Durham, North Carolina. "Once we appreciate that child maltreatment brings hidden damage that can resurface years later as memory problems, preventing child abuse seems like a very good deal."

Questions 14-17

Reading Passage 2 has seven sections **A-G**.

Which section contains the following information?

Write the correct letter **A-G** in boxes **14-17** on your answer sheet.

- 14. A prerequisite for more strong stress-related reactions
- 15. An example of differences in brain structure between depressed and non-depressed individuals
- 16. The function of white matter in the brain
- 17. A suggestion for preventing persisiting damage brought by child mistreat

Questions 18-21

Do the following statements agree with the information given in Reading Passage 2?

In boxes **18-21** on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

- 18. Whalley found that depression is a direct cause of having a bad memory.
- 19. Genetic risk scores acted as a prediction of depression.
- 20. Depression contribute to most brain structure differences.
- 21. Neglected parts in the brain can still maintain their functions.

Questions 22-26

Look at the following statements and the list of people's names below.

Match each statement with the correct person, **A-D**

Write the correct letter, **A-D**, in boxes **22-26** on your answer sheet.

- 22. A young children suffering from stress may find it hard to handle stress later in life.
- 23. Depressed people's brains may not well-function compared to others.
- 24. A higher genetic risk of depression may result in white matter differences and obstructing brain functions.
- 25. Memory issues resulted from child mistreatment tend to appear again after being absent for a long time.
- 26. Abused and impoverished children are easily susceptible to stress in the future.

List of names

- A. Heather Whalley
- B. Maxime Taquet
- C. Carmine Pariante
- D. Terrie Moffitt