Lifestyle choices can affect how we store information in the brain

January 10 2018

A team of researchers has carried out the first study that establishes a link between a person's working memory and their physical health and lifestyle choices.

Working memory is the ability to store, update and manipulate information that's relevant to a particular goal. It's a central concept in the study of cognitive neuroscience as it deals with mechanisms of active information maintenance and cognitive control that underpin a large amount of complex behaviour.

It supports other higher-order cognitive abilities such as fluid intelligence – the capacity to reason and solve new problems, independent of any previous knowledge – learning, problem-solving and decision-making, as well as lower-order mental operations.

To reach their conclusions, the consortium of researchers, drawn from around the EU and partner countries, monitored the brain activity of more than 800 people as they performed a specific task, in order to come up with a brain map of working memory. They then used a statistical method known as 'sparse canonical correlation' to explore the relationships between this map and 116 measures of cognitive ability, physical and mental health, personality and lifestyle choices.

The results of their study were published in the journal 'Molecular Psychology'. In the journal, they note that 'fluid intelligence had the strongest positive correlation with neuroimaging phenotypes of working

memory function'. This finding enhances understanding of the way fluid intelligence and working memory interact. Their results show that even when multiple other variables are taken into account, fluid intelligence remains strongly correlated with the functional integrity of the working memory network, suggesting that these two cognitive constructs are supported by common neural mechanisms.

Researchers found positive associations between the working memory and higher physical endurance and better cognitive function. Conversely, they noted the opposite association between less desirable factors such as a high body mass index and lifestyle choices including regular smoking and excessive alcohol consumption.

These findings also underline the importance of behavioural health factors in neuroimaging studies of working memory, and provide a framework for personalised and public health interventions in relation to mental health that's informed by neuroscience.

The study received EU funding under the project IMAGEMEND (IMAging GEnetics for MENtal Disorders), a wide-ranging project focusing on schizophrenia, bipolar disorder and attention deficit-hyperactivity disorder. Mental disorders are the leading cause of disability, absence from work and early retirement in Europe. The project has collated Europe's largest dataset combining neuroimaging, genetic, environmental, cognitive and clinical information about 13 000 participants, to identify the patient characteristics most relevant for treatment. It also aims to derive biomarkers and decision rules that will lead to automated imaging-based diagnostic and predictive tests tailored for distribution throughout Europe within standard clinical settings.

More information: Project website: www.imagemend.eu/

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