Working memory deficits may compromise cognitive flexibility in OCD

By Dr. Jessica K Edwards

Obsessive compulsive disorder (OCD) is characterised by recurrent intrusive thoughts and/or behaviours. These traits imply deficits in cognitive flexibility in affected patients, but it is unclear at what stage of information processing these deficits might emerge. To address this question, Nicole Wolff and colleagues asked 25 adolescents with OCD and 25 matched healthy controls to complete a computer-based task switching paradigm.[1]

Here, the task switches were either signalled by a visual stimulus or had to be triggered by working memory processes. During the task, the participants were monitored by EEG to measure the profile and source of event-related potentials (ERPs) — voltages generated in brain structures that can distinguish different stages of information processing. The positive and negative deflections in the ERP waveforms include deflections that are associated with response-associated processes (known as N2 and P3) and a deflection that reflects inhibitory control during sensory categorisation processes (known as P1). At the behavioural level, the researchers found that switching performance was only compromised in patients with OCD when the working memory was involved.

Conversely, working memory processes were irrelevant for switching performance in healthy controls. This difference was underscored by a dampened P1 amplitude during memory-based switching conditions in patients with OCD compared to controls and altered ERP activation in the right inferior frontal gyrus and superior temporal gyrus. These findings suggest that inhibitory control mechanisms during early stimulus categorisation processes underlie cognitive inflexibility in OCD.

Referring to:

Wolff, N., Buse, J., Tost, J., Roessner, V. and Beste, C. (2017), Modulations of cognitive flexibility in obsessive compulsive disorder reflect dysfunctions of perceptual categorization. J. Child Psychol. Psychiatr. 58: 939-949. doi: 10.1111/jcpp.12733.

Further reading:

[1]Gajewski, P.D. et al. (2011), The Met-allele of the BDNF Val66Met polymorphism enhances task switching in elderly. Neurobiol. Aging 32: 2327.e7-2327.e19. doi: 10.1016/j.neurobiolaging.2011.06.010.

Glossary:

Inhibitory control: the voluntary capacity to inhibit or regulate prepotent attentional or behavioural responses. Inhibitory control requires the ability to focus on relevant stimuli in the presence of irrelevant stimuli, and to override strong but inappropriate behavioural tendencies.

Event-related potentials (ERPs): the measured electrophysiological response to a stimulus; the ERP waveform is measured by electroencephalography and consists of a series of positive and negative voltage deflections.