MEG confirms hyper-vigilance followed by threat avoidance in children with anxiety disorder

By Dr Jessica K Edwards

A key etiological factor of anxiety disorders is an altered pattern of threat processing, but its neurobiological basis is relatively unclear.[1] Now, a study conducted by researchers at the University of Münster has used whole-head magnetoencephalography (MEG) at a resolution of 1 millisecondto determine whether children with anxiety disorder show hyper-vigilance to threat cues during early or late stages of neurological processing.

The researchers analysed neural responses in 23 children with anxiety disorders and 23 healthy controls whilst the participants viewed images of faces with angry or neutral expressions. The researchers found that early threat processing (50-150 ms upon viewing the visual stimulus) was relatively enhanced in the visual cortical regions of children with anxiety disorders compared to controls; this effect was reversed at a later time interval (300-700 ms).

Affected children also exhibited relatively reduced inhibition of early threat processing in the right dorsolateral prefrontal cortex but enhanced inhibition at a later time interval. Overall, children with anxiety rated angry faces as more threatening, and this was accompanied by enhanced visual cortical processing of angry versus neutral faces in an early time window. Comparable emotional state ratings between the affected children and controls suggested that these effects were not due to different states of anxiety, but instead correlated with trait anxiety: the more trait anxious the children were, the higher priority the threat cues gained in the visual stream in the early perceptive stage.

The researchers conclude that their findings support the hypothesis of early sensory hyper-vigilance followed by later threat avoidance[2] in children with anxiety disorder.

Study Implications

Gaps and recommendations for further science:
Future research may consider use of MEG scans to demonstrate whether treatment for anxiety has an effect on hypervigilance to threat cues.

Referring to:

Wessing, I., Romer, G. & Junghöfer, M. (2017), Hypervigilance-avoidance in children with anxiety disorders: magnetoencephalographic evidence. J Child Psychol Psychiatr. 58: 103-112. doi:10.1111/jcpp.12617

Further reading:

[1]Cisler, J.M. et al. (2010) Mechanisms of attentional biases towards threat in anxiety disorders: An integrative review. Clin Psychol Rev. 30: 203-216. doi: 10.1016/j.cpr.2009.11.003.

[2]Mogg, K. et al. (2004) Time course of attentional bias for threat scenes: Testing the vigilance-avoidance hypothesis.Cogn Emot 18: 689-700. doi: 10.1080/02699930341000158

Glossary:

State anxiety: a temporary emotional state in response to a potentially threatening environmental event.

Trait anxiety: a relatively stable personality disposition to judge a wide range of environmental events as potentially threatening.

Magnetoencephalography (MEG): a non-invasive, functional neuroimaging technique to map brain activity at the millisecond level by recording the magnetic fields produced by the naturally occurring electrical currents in the brain.