

# Anxious children have bigger 'fear centers' in the brain

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The amygdala is a key "fear center" in the brain. Alterations in the development of the amygdala during childhood may have an important influence on the development of anxiety problems, reports a new study in the current issue of *Biological Psychiatry*.

Researchers at the Stanford University School of Medicine recruited 76 children, 7 to 9 years of age, a period when anxiety-related traits and symptoms can first be reliably identified. The children's parents completed assessments designed to measure the anxiety levels of the children, and the children then underwent non-invasive magnetic resonance imaging (MRI) scans of brain structure and function.

The researchers found that children with high levels of anxiety had enlarged amygdala volume and increased connectivity with other brain regions responsible for attention, emotion perception, and regulation, compared to children with low levels of anxiety. They also developed an equation that reliably predicted the children's [anxiety level](#) from the MRI measurements of amygdala volume and amygdala functional connectivity.

The most affected region was the basolateral portion of the amygdala, a subregion of the amygdala implicated in fear learning and the processing of emotion-related information.

"It is a bit surprising that alterations to the structure and connectivity of the amygdala were so significant in children with higher levels of anxiety, given both the young age of the children and the fact that their anxiety levels were too low to be observed clinically," commented Dr. Shaozheng Qin, first author on this study.

Dr. John Krystal, Editor of *Biological Psychiatry*, commented, "It is critical that we move from these interesting cross-sectional observations to longitudinal studies, so that we can separate the

extent to which larger and better connected amygdalae are risk factors or consequences of increased childhood anxiety."

"However, our study represents an important step in characterizing altered brain systems and developing predictive biomarkers in the identification for young children at risk for [anxiety disorders](#)," Qin added. "Understanding the influence of [childhood anxiety](#) on specific [amygdala](#) circuits, as identified in our study, will provide important new insights into the neurodevelopmental origins of [anxiety](#) in humans."

**More information:** The article is "Amygdala Subregional Structure and Intrinsic Functional Connectivity Predicts Individual Differences in Anxiety During Early Childhood" by Shaozheng Qin, Christina B. Young, Xujun Duan, Tianwen Chen, Kaustubh Supekar, and Vinod Menon ([DOI: 10.1016/j.biopsych.2013.10.006](https://doi.org/10.1016/j.biopsych.2013.10.006)). The article appears in *Biological Psychiatry*, Volume 75, Issue 11 (June 1, 2014)

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