



## News Articles, Attention-Deficit/Hyperactivity Disorder (ADHD), Cognition/Language/Learning Disorders, Neurology

### Study: Brain differences found in children with ADHD

by Melissa Jenco, News Content Editor

As many as five brain regions may not be fully developed in children with attention-deficit/hyperactivity disorder (ADHD), according to a new imaging study.

"The results from our study confirm that people with ADHD have differences in their brain structure and therefore suggest that ADHD is a disorder of the brain," lead author Martine Hoogman, Ph.D., said in a news release. "We hope that this will help to reduce stigma that ADHD is 'just a label' for difficult children or caused by poor parenting."

Worldwide, about 5.3% of children have ADHD, and symptoms persist into adulthood for about two-thirds, according to the study "Subcortical brain volume differences in participants with attention deficit hyperactivity disorder in children and adults: a cross-sectional mega-analysis" (Hoogman M, et al. *Lancet Psychiatry*. Feb. 15, 2017, <http://bit.ly/2knqMW5>).

With funding from the National Institutes of Health, researchers from the international ENIGMA ADHD Working Group embarked on what they said is the largest study performed on brain differences in people with and without ADHD. They analyzed MRI data from 1,713 people with ADHD and 1,529 controls ranging in age from 4 to 63 years.

The team found those with ADHD had smaller brain volumes in the accumbens, amygdala, caudate, hippocampus and putamen regions. Intracranial volume also was lower. They dubbed ADHD a "disorder or brain maturation delay" and said structural differences were greatest for children. In adults, there were no significant differences between those with ADHD and the control group.

The research confirms previous findings on the caudate and putamen and shows the impact is bilateral, the study said. The findings on the accumbens, amygdala and hippocampus were new. The large impact seen in the amygdala, which regulates emotions, may change the way ADHD is viewed.

"These differences are very small - in the range of a few percent - so the unprecedented size of our study was crucial to help identify these," Dr. Hoogman said. "Similar differences in brain volume are also seen in other psychiatric disorders, especially major depressive disorder."

However, neither a comorbid psychiatric disorder nor psychostimulant medications appeared to cause the brain differences of people in the study with ADHD, authors wrote.

In a [related commentary](#), Claudia Lugo-Candelas, Ph.D., and Jonathan E. Posner, M.D., praised the group's collaboration on such a large study.

"This study represents an important contribution to the field by providing robust evidence to support the notion of ADHD as a brain disorder with substantial effects on the volumes of subcortical nuclei," they wrote. "Future meta-analyses and mega-analyses will need to investigate medication effects as well as the developmental course of volumetric differences in this disorder."

#### Resources

- [AAP clinical guidelines on diagnosing and treating ADHD](#)
- [Information for parents on ADHD](#)



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