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Recovery from childhood ADHD may depend on the pattern of brain development

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Some people grow out of their childhood attention-deficit/hyperactivity disorder (ADHD) and some don't. In fact, around 50% of individuals diagnosed as children continue to suffer from ADHD as adults.

Researchers are trying to understand the reasons why, and relatedly, whether there are any differences that distinguish the two groups. Gender, ethnicity, socioeconomic class, and symptom severity have already been ruled out as potentials. So, perhaps there is a distinguishing variable in the brain? Dr. Philip Shaw at the National Human Genome Research Institute and his colleagues conducted a study to find out.

They already knew from prior work that cortical structure is thinner in adults with ADHD, particularly in regions of the brain that play important roles in cognitive functioning and attention. However, that work was cross-sectional, meaning it was conducted at a single point in time, so any changes over time weren't captured. Thus, they focused on those same regions in this study, but conducted a longitudinal study so they could link trajectories of symptoms with trajectories of brain development, particularly the structure of cortical regions that control attention.

They recruited 92 children with ADHD, with a mean age of 11, who underwent repeated structural imaging scans and clinical assessments over the years, including as adults at a mean age of 24 years. For comparison, they also scanned 184 volunteers without ADHD.

They found that ADHD continued into adulthood in 37 (40%) of the participants diagnosed with childhood ADHD, and these individuals showed increased rates of thinning. In contrast, the cortical thickness of individuals who achieved remission of their ADHD developed toward the normal range.

"We find that differences in patterns of brain growth are linked with differences in the adult outcome of childhood ADHD. Differences in these regions – specifically a thinner cortex – are found in childhood ADHD," Shaw further explained. "However, for the group whose ADHD improved with age, these differences tend to resolve and by adulthood, these regions did not differ significantly from individuals who never had ADHD. By contrast, for the group with persistent ADHD, childhood differences persisted in the 'attention' regions of the brain."

These findings seem to suggest that the trajectory of cortex development differentiates people who recover from childhood ADHD from people whose disorder continues into adulthood.

"The development of the cortex seems to be a critical factor influencing the recovery from childhood ADHD. However, there is much that we do not understand about this relationship," commented Dr. John Krystal, Editor of *Biological Psychiatry*. "Cortical thinning may be related to the pruning of connections in the brain, in this case, connections with the prefrontal cortex. The current data would seem to suggest that excessive trimming of connections is a risk factor for the persistence of ADHD into adulthood. But we do not yet understand which connections are being trimmed, why these connections disappear, and how this loss of connections contributes to ADHD symptoms."

More work will be necessary to answer these questions, but Shaw concludes that "understanding how differences in brain development are

tied to the course of ADHD is the first step in developing tools to help us predict the outcome of childhood ADHD."

More information: The article is "Trajectories of Cerebral Cortical Development in Childhood and Adolescence and Adult Attention-Deficit/Hyperactivity Disorder" by Philip Shaw, Meaghan Malek, Bethany Watson, Deanna Greenstein, Pietro de Rossi, and Wendy Sharp (DOI: 10.1016/j.biopsych.2013.04.007). The article appears in *Biological Psychiatry*, Volume 74, Issue 8 (October 15, 2013.

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