

Anomalous Brain Development Is Evident in Preschoolers With Attention-Deficit/Hyperactivity Disorder.

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Abstract

OBJECTIVES:

Attention-deficit/hyperactivity disorder (ADHD) is a common neurological disorder with symptom onset early in childhood. Growing evidence suggests anomalous brain development across multiple brain regions is evident in school-aged children; however, few studies have examined whether such differences are notable in the preschool years when symptom onset typically occurs.

METHODS:

High resolution anatomical (MPRAGE) images and cognitive and behavioral measures were analyzed in a total of 90 medication-naïve preschoolers, ages 4-5 years (52 with ADHD, 38 controls; 64.4% boys).

RESULTS:

Results revealed reductions in bilateral frontal, parietal, and temporal lobe gray matter volumes in children with ADHD relative to typically developing children, with largest effect sizes noted for right frontal and left temporal lobe volumes. Examining frontal lobe sub-regions, the largest between group effect sizes were evident for left orbitofrontal cortex, left primary motor cortex (M1), and left supplementary motor complex (SMC). ADHD-related reductions in specific sub-regions (left prefrontal, left premotor, left frontal eye field, left M1, and right SMC) were significantly correlated with symptom severity, such that higher ratings of hyperactive/impulsive symptoms were associated with reduced cortical volumes.

CONCLUSIONS:

These findings represent the first comprehensive examination of cortical volume in preschool children with ADHD, providing evidence that anomalous brain structure in ADHD is evident very early in development. Furthermore, findings set the stage for developing our understanding of the way in which developmental trajectories of anomalous brain development are associated with the unfolding of symptoms in childhood ADHD.