Distinct frontal lobe morphology in girls and boys with ADHD

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Objective
This study investigated whether frontal lobe cortical morphology differs for boys and girls with ADHD (ages 8–12 years) in comparison to typically developing (TD) peers.

Method
Participants included 226 children between the ages of 8–12 including 93 children with ADHD (29 girls) and 133 TD children (42 girls) for which 3T MPRAGE MRI scans were obtained. A fully automated frontal lobe atlas was used to generate functionally distinct frontal subdivisions, with surface area (SA) and cortical thickness (CT) assessed in each region. Analyses focused on overall diagnostic differences as well as examinations of the effect of diagnosis within boys and girls.

Results
Girls, but not boys, with ADHD showed overall reductions in total prefrontal cortex (PFC) SA. Localization revealed that girls showed widely distributed reductions in the bilateral dorsolateral PFC, left inferior lateral PFC, right medial PFC, right orbitofrontal cortex, and left anterior cingulate; and boys showed reduced SA only in the right anterior cingulate and left medial PFC. In contrast, boys, but not girls, with ADHD showed overall reductions in total premotor cortex (PMC) SA. Further localization revealed that in boys, premotor reductions were observed in bilateral lateral PMC regions; and in girls reductions were observed in bilateral supplementary motor complex. In line with diagnostic group differences, PMC and PFC SAs were inversely correlated with symptom severity in both girls and boys with ADHD.

Conclusions
These results elucidate sex-based differences in cortical morphology of functional subdivisions of the frontal lobe and provide additional evidence of associations among SA and symptom severity in children with ADHD.