

Neural correlates of cognitive function and symptoms in attention-deficit/hyperactivity disorder in adults

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Abstract

While gray matter (GM) anomalies have been reported for attention-deficit/hyperactivity disorder (ADHD), investigating their associations with cognitive deficits and individual symptom domains can help pinpoint the neural underpinnings critical for the pathology of ADHD, particularly the persist form of ADHD. In this work, we performed both independent component analysis and voxel-based morphometry analysis on whole brain GM of 486 adults including 214 patients, 96 unaffected siblings, and 176 healthy controls, in relation to cognition and symptoms. Independent component analysis revealed that higher GM volume in inferior semilunar lobule, inferior frontal gyri, and superior and middle frontal gyri was associated with better working memory performance, and lower GM volume in cerebellar tonsil and culmen was associated with more severe inattention symptoms. Consistently, voxel-based morphometry analysis showed that higher GM volume in multiple regions of frontal lobe, cerebellum and temporal lobe was related to better working memory performance. Focusing on the networks derived from ICA, our results integrated prefrontal regions and cerebellar regions through associations with working memory and inattention symptoms, lending support for the theory of 'cool'-cognition dysfunction being mediated by inferior fronto-striato-cerebellar networks in ADHD. Siblings showed intermediate cognitive impairments between patients and controls but presented GM anomalies in unique focal regions, suggesting they are a separate group potentially affected by the shared genetic and environmental risks with ADHD patients.