Functional connectivity of the vigilant-attention network in children and adolescents with attention-deficit/hyperactivity disorder.


Abstract

The ability to maintain attention to simple tasks (i.e., vigilant attention, VA) is often impaired in attention-deficit/hyperactivity disorder (ADHD), but the underlying pathophysiological mechanisms at the brain network level are not clear yet. We therefore investigated ADHD-related differences in resting-state functional connectivity within a meta-analytically defined brain network of 14 distinct regions subserving VA (comprising 91 connections in total), as well as the association of connectivity with markers of behavioural dysfunction in 17 children (age range: 9-14 years) with a diagnosis of ADHD and 21 age-matched neurotypical controls. Our analyses revealed selective, rather than global, differences in the intrinsic coupling between nodes of the VA-related brain network in children with ADHD, relative to controls. In particular, ADHD patients showed substantially diminished intrinsic coupling for 7 connections and increased coupling for 4 connections, with many differences involving connectivity with the anterior insula. Moreover, connectivity strength of several aberrant connections was found to be associated with core aspects of ADHD symptomatology, such as poor attention, difficulties with social functioning, and impaired cognitive control, attesting to the behavioural relevance of specific connectivity differences observed in the resting state.