Altered functional connectivity in default mode network in Internet gaming disorder: Influence of childhood ADHD.

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Abstract

OBJECTIVE:
Internet gaming disorder (IGD) is a type of behavioural addiction characterised by abnormal executive control, leading to loss of control over excessive gaming. Attention deficit and hyperactivity disorder (ADHD) is one of the most common comorbid disorders in IGD, involving delayed development of the executive control system, which could predispose individuals to game addiction. We investigated the influence of childhood ADHD on neural network features of IGD.

METHODS:
Resting-state functional magnetic resonance imaging analysis was performed on 44 young, male IGD subjects with and without childhood ADHD and 19 age-matched, healthy male controls. Posterior cingulate cortex (PCC)-seeded connectivity was evaluated to assess abnormalities in default mode network (DMN) connectivity, which is associated with deficits in executive control.

RESULTS:
IGD subjects without childhood ADHD showed expanded functional connectivity (FC) between DMN-related regions (PCC, medial prefrontal cortex, thalamus) compared with controls. These subjects also exhibited expanded FC between the PCC and brain regions implicated in salience processing (anterior insula, orbitofrontal cortex) compared with IGD subjects with childhood ADHD. IGD subjects with childhood ADHD showed expanded FC between the PCC and cerebellum (crus II), a region involved in executive control. The strength of connectivity between the PCC and cerebellum (crus II) was positively correlated with self-reporting scales reflecting impulsiveness.

CONCLUSION:
Individuals with IGD showed altered PCC-based FC, the characteristics of which might be dependent upon the history of childhood ADHD. Our findings suggest that altered neural networks for executive control in ADHD would be a predisposition for developing IGD.