

# **Preliminary evidence of altered gray matter volume in subjects with internet gaming disorder: associations with history of childhood attention-deficit/hyperactivity disorder symptoms.**

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## **Abstract**

Attention-deficit/hyperactivity disorder (ADHD) is commonly comorbid with Internet gaming disorder (IGD). Although childhood ADHD symptoms may decline during late brain maturation, structural alterations in some brain areas may persist into adulthood. This study investigated whether young adults with IGD and a history of childhood ADHD symptoms had gray matter volume (GMV) alterations that were distinct from subjects without a history of childhood ADHD. As an exploratory investigation, we conducted a whole-brain voxel-based morphometry with the diffeomorphic anatomical registration using an exponentiated Lie algebra algorithm and applied an uncorrected threshold at the voxel level for multiple comparisons. GMVs of IGD subjects with a history of childhood ADHD (IGDADHD+ group;  $n = 20$ ;  $24.5 \pm 2.5$  years) were compared to those of subjects without a history of childhood ADHD (IGDADHD- group;  $n = 20$ ;  $23.9 \pm 2.5$  years) and controls ( $n = 20$ ;  $22.7 \pm 2.4$  years). Compared with controls, both IGD groups had a smaller GMV in the right anterior cingulate cortex, the left inferior frontal gyrus, and the left insula, yet had a larger GMV in the right angular gyrus. The IGDADHD+ group had a larger GMV in the right precuneus than the IGDADHD- group and controls. When controlling for other comorbid psychiatric symptoms, the IGDADHD+ group also had a smaller GMV in the right inferior frontal gyrus. In conclusion, we found that young adults with IGD and a history of childhood ADHD symptoms had characteristic GMV alterations, which may be linked with their manifestation of childhood ADHD.