

Exploring Physical Activity Patterns in Children With ADHD: The Impact of Sex, Symptom Presentation, and Shared Genetics

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Background: Individuals with attention-deficit/hyperactivity disorder (ADHD) have a higher risk of negative health outcomes. This is partially due to unhealthy lifestyle factors such as low physical activity (PA); however, there is mixed evidence about the nature of the association between ADHD and PA. Furthermore, evidence is limited regarding sensor-based measurements of PA, sex differences, and ADHD symptom presentations.

Purpose: This study aimed to increase the understanding of the association between ADHD symptoms and PA patterns measured through accelerometry and to determine whether sex and type of symptoms modify this association. Previous evidence suggests that children with ADHD tend to engage more in unstructured PA. Hence, accelerometry-measured PA could add valuable insight into the association. In addition, this study applies a unique twin design, which allows to control shared genetic and environmental factors. This could aid the design of targeted preventive and therapeutic interventions.

Methods: This cross-sectional register-based twin study included children from the Swedish Twin Registry (STR). ADHD symptoms were assessed at age nine through a questionnaire based on the DSM-V criteria. Triaxial accelerometry measured PA patterns, including daily average time in sedentary behaviour (SED), light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA). Linear GEE regression models were used to assess the association in the full cohort and stratified by sex. Hyperactivity and inattention were analysed together and as separate exposures. The analysis was repeated separately for dizygotic (DZ) and monozygotic (MZ) twins. Regression coefficients and 95% confidence interval (CI) were calculated.

Results: A total of 1,514 children (52.64% girls) were included. ADHD symptoms were significantly associated with higher MVPA ($\beta = 0.26$; 95% CI = 0.05–0.46) in the full cohort. Hyperactivity symptoms were significantly associated with higher MVPA, and lower SED in girls. The associations became non-significant among MZ twins.

Conclusion: Our findings suggest that children with ADHD symptoms might have different PA patterns depending on sex and type of symptoms. However, the associations seemed to be explained by shared genetic and environmental factors. Further longitudinal studies are needed to corroborate these results.

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