

Volitional eye movement control and ADHD traits: a twin study.

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Abstract

BACKGROUND:

Top-down volitional command of eye movements may serve as a candidate endophenotype of ADHD, an important function underlying goal-directed action in everyday life. In this twin study, we examined the relation between performance on a response inhibition eye-tracking paradigm and parent-rated ADHD traits in a population-based twin sample. We hypothesized that altered eye movement control is associated with the severity of ADHD traits and that this association is attributable to genetic factors.

METHODS:

A total of 640 twins (320 pairs, 50% monozygotic) aged 9-14 years) from the Child and Adolescent Twin Study in Sweden (CATSS) participated. Twins performed the antisaccade task indexing inhibitory alterations as either direction errors (following exogenous cues rather than instructions) or premature anticipatory eye movements (failure to wait for cues). We calculated the associations of eye movement control and ADHD traits using linear regression mixed-effects models and genetic and environmental influences with multivariate twin models.

RESULTS:

Premature anticipatory eye movements were positively associated with inattentive traits ($\beta = .17$; 95% CI: 0.04, 0.31), while controlling for hyperactive behaviors and other covariates. Both premature anticipatory eye movements and inattention were heritable ($h^2 = 0.40$, 95% CI: 0.22, 0.56; $h^2 = 0.55$; 95% CI: 0.42, 0.65; respectively), and their genetic correlation was small but statistically significant ($r = .19$, 95% CI: 0.02, 0.36). However, the genetic correlation did not remain significant after adjusting for covariates (age, sex, hyperactivity traits, IQ). No link was found between direction errors and ADHD traits.

CONCLUSIONS:

This study indicates that there is a specific, genetically influenced, relation between top-down eye movement control and the inattentive traits typical of ADHD.