Reduced Interference of Distractor Stimuli in Female Undergraduates with ADHD

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Theoretical Background

Female undergraduates with Attention Deficit/Hyperactivity Disorder (ADHD) participated in a combined Flanker and Simon task. Compared with a control group the ADHD group displayed reduced influence of distractor stimuli (i.e., flankers and stimulus location) as well as generally prolonged reaction times, suggesting that response slowing is associated with a more advanced stimulus analysis.

Adults with ADHD are assumed to have similar neuropsychological deficits (e.g., longer reaction times, more errors) as children with ADHD (Nigg et al., 2005; Mueller et al., 2007). Sparse research about university students with ADHD and especially about female undergraduates with ADHD exists. Further, available empirical evidence regarding a selective attention deficit in ADHD is mixed (see Posner, 2004). In the present study we examined selective attention in female undergraduates with and female students without ADHD.

Method

Participants

Sixteen female students (*M* = 29.8 years, *SD* = 5.8) were diagnosed with ADHD as their primary disorder by the head neurologist of a local psychiatric institution. All participants were not medicated with Methylphenidate (MPH) 48 hours before and at the time of investigation. Exclusion criteria were comorbid disorders and medication with MPH. The 25 comparison female students (*M* = 23.2 years, *SD* = 4.1) without ADHD were recruited from the University of Hamburg/Germany and passed through the same diagnostic procedure as participants with ADHD. Exclusion criteria were any psychiatric disorder and intake of any medication.

As diagnostic procedures were used: self-assessment questionnaires, interviews, ratings by significant others, intelligence tests, neuropsychological tests (i.e., Go/NoGo task). All participants (ADHD & control participants) completed these clinical tests on several days. Concerning a self-regulation questionnaire (Tangney, Baumeister, Boone, 2002) females with ADHD (*M* = 3.4, *SD* = .35) and without ADHD (*M* = 2.9, *SD* = .34) differed significantly, *F*(1,39) = 10.45, *p* = .000.

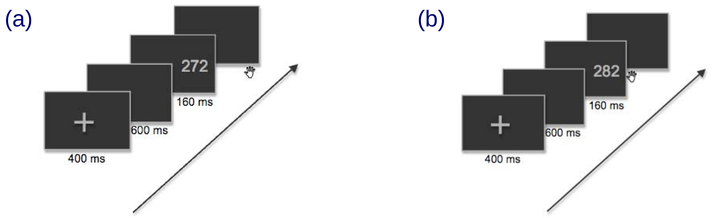
Design

The study followed a 2-between (Group: ADHD vs. control) X 2-within (Frequency: frequent vs. non-frequent conflict) X 2-within (Flanker: compatible vs. incompatible) X 2-within (Simon: compatible vs. incompatible) design. Dependent variables were reaction times and error rates in the combined Flanker and Simon Task.

Procedure

Both groups participated in a combined Flanker and Simon task (Hommel, 1997; Figure 1). In this task the target stimulus was flanked by distractor stimuli, which could be associated with either the correct or an incorrect response (compatible and incompatible flanker condition, respectively) and occurred at a location that unpredictably matched or mismatched the location of the correct response (spatial correspondence vs. non-correspondence).

Figure 1. Example of Two Combined Flanker and Simon Task-Trials; (a) Flanker = 272: incompatible, Simon = press right key for odd number: compatible; (b) Flanker = 282: compatible, Simon = press left key for even number: incompatible



Results

A mixed 2-between (Group: ADHD vs. control) X 2-within (Frequency: frequent vs. non-frequent conflict) X 2-within (Flanker: compatible vs. incompatible) X 2-within (Simon: compatible vs. incompatible) MANOVA on reaction times and error rates revealed a significant effect of Group, *F*(1,39) = 3.71, *p* = .034, a significant effect of Frequency, *F*(1,39) = 11.44, *p* = .000, a significant effect of Flanker, *F*(1,39) = 55.99, *p* = .000, and a significant interaction effect of Frequency X Flanker, *F*(1,39) = 8.31, *p* = .001. Further, there was a marginal significant 2-way interaction of Simon X Group, *F*(1,39) = 2.83, *p* = .07. The remaining main and interaction effects were not significant (all *F*s < 1, *ns*).

Further Analyses

Participants with and without ADHD slowed down their responses in blocks with frequent conflict, *F*(1,39) = 25.61, *p* = .000. Also the group difference was significant *F*(1,39) = 6.14, *p* = .018; whereas the interaction effect was not (*F* < 1, *ns*; see Figure 2).

Figure 3 illustrates a 2-between (Group: ADHD vs. control) X 2-within (Conflict: maximum vs. minimum) repeated measurements ANOVA on reaction times. There was a significant effect of Group, *F*(1,39) = 5.74, *p* = .022, a significant effect of Conflict, *F*(1,39) = 84.83, *p* = .000, and no significant interaction effect, *F*(1,39) = .13, *ns*.

Discussion

Reaction times were overall prolonged in the ADHD group. However, this response slowing was associated with a reduction of both the effect of the flankers (i.e., performance decrement on incompatible as compared to compatible trials) and the stimulus location (i.e., performance decrement on spatially non-corresponding as compared to spatially corresponding trials) in error rates. This effect is even more pronounced in difficult trials (i.e., frequent and maximum conflict).

Figure 2. Reaction Times (Only Compatible Flanker)

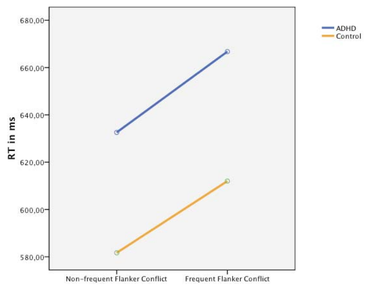
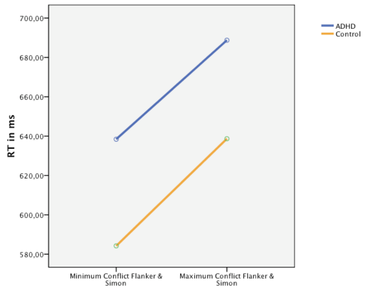


Figure 3. Reaction Times in Minimum and Maximum Conflict-Trials (Flanker & Simon)



Conclusion

Our results suggest that the increase in reaction times is used for a more advanced stimulus analysis, thus enabling participants with ADHD to respond more selectively to target stimulus information than control participants. Therefore, the response pattern displayed by female undergraduates with ADHD might be the consequence of a compensation mechanism.

References

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