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Brain lateralization and self-reported symptoms of ADHD in non-clinical adults: A dimensional approach

Saleh Mohamed^{1,2}, Reint Geuze¹, Norbert Borger¹, and Jaap van der Meere¹

¹Department of Clinical and Developmental Neuropsychology, University of Groningen, Netherlands

²Department of Psychology, Beni-Suef University, Egypt.

Introduction

Many clinical studies reported a compromised brain lateralization in patients with Attention-Deficit/Hyperactivity Disorder (ADHD) without being conclusive about which hemisphere is affected. It is well-recognized that studying non-clinical ADHD dimensionally is more controlled for comorbid problems and medication effects.

Aim: to test the dimensional relationship between brain lateralization and self-reported ADHD symptoms in a sample of non-clinical adults

Methods

Participants: 85 right-handed university students.

ADHD Questionnaire: The Conners' Adult ADHD Rating Scales.

Reaction Time Tasks: To match letters (verbal processing) or shapes (non-verbal processing) displayed in the Left Visual Field (LVF) or Right Visual Field (RVF) see figure 1.

Brain lateralization index = $\frac{RVF - LVF}{Mean\ performance} \times 100$ for RT and number of errors.

Compromised right hemisphere processing or enhanced left hemisphere processing in ADHD symptomatology is reflected by a small value of brain lateralization index.

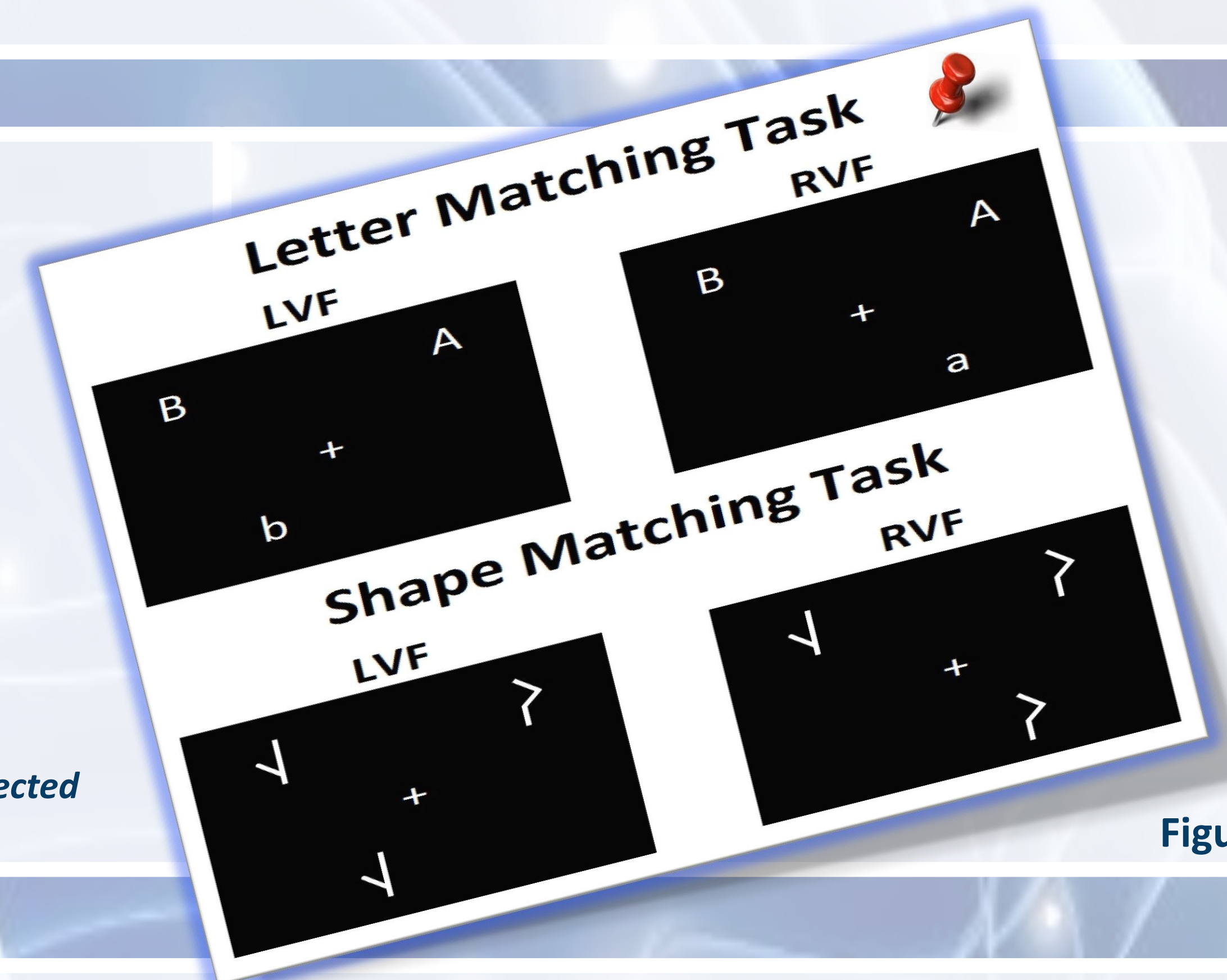


Figure 1

Results

Regression analyses indicate that:

- Brain lateralization index calculated from RT was not related to ADHD symptoms ($R^2 \leq .063, p \geq .11$).
- Brain lateralization index calculated from errors was weakly but significantly associated with the key domains of self-reported ADHD symptoms (see Table 1).

Table 1 shows that:

- In the letter matching task, more hyperactive symptoms were related to smaller value of the lateralization index.
- In the shape matching task, more inattentive symptoms were related to smaller value of the lateralization index.

For further analysis, the differences in lateralization index (calculated from errors) between subjects with high and low DSM-IV ADHD symptoms were tested.

Compared to subjects with low symptoms, T-tests indicated that:

- Subjects with high hyperactive-impulsive symptoms had a significant smaller lateralization index (more accurate responses in RVF/left hemisphere) in the verbal letter matching task.
- Subjects with high inattentive symptoms had a significant trend to have smaller lateralization index (less accurate responses in LVF/right hemisphere) in the non-verbal shape matching task (see figure 2).

Table 1. The Outcome of Multivariable linear regression analyses.

Task	Predictor	β	R	R^2	Adjusted R^2
Letter Matching Task	Inattention	.008	.34*	.12*	.08*
	Hyperactivity	-.328*			
	Impulsivity	-.031			
Shape Matching Task	Inattention	-.304*	.29†	.09†	.05†
	Hyperactivity	.097			
	Impulsivity	.150			

Note. † $p < .10$. * $p < .05$

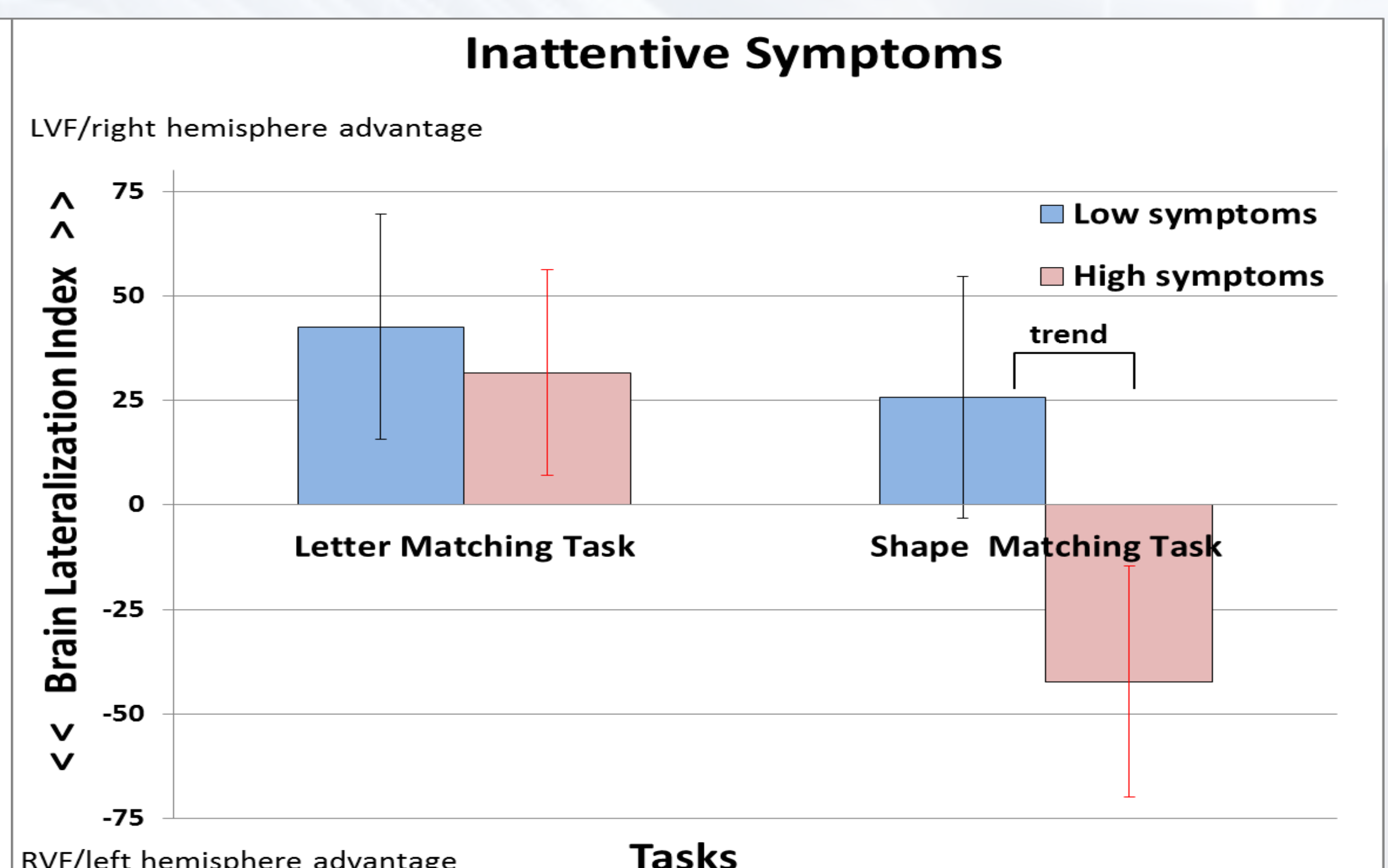
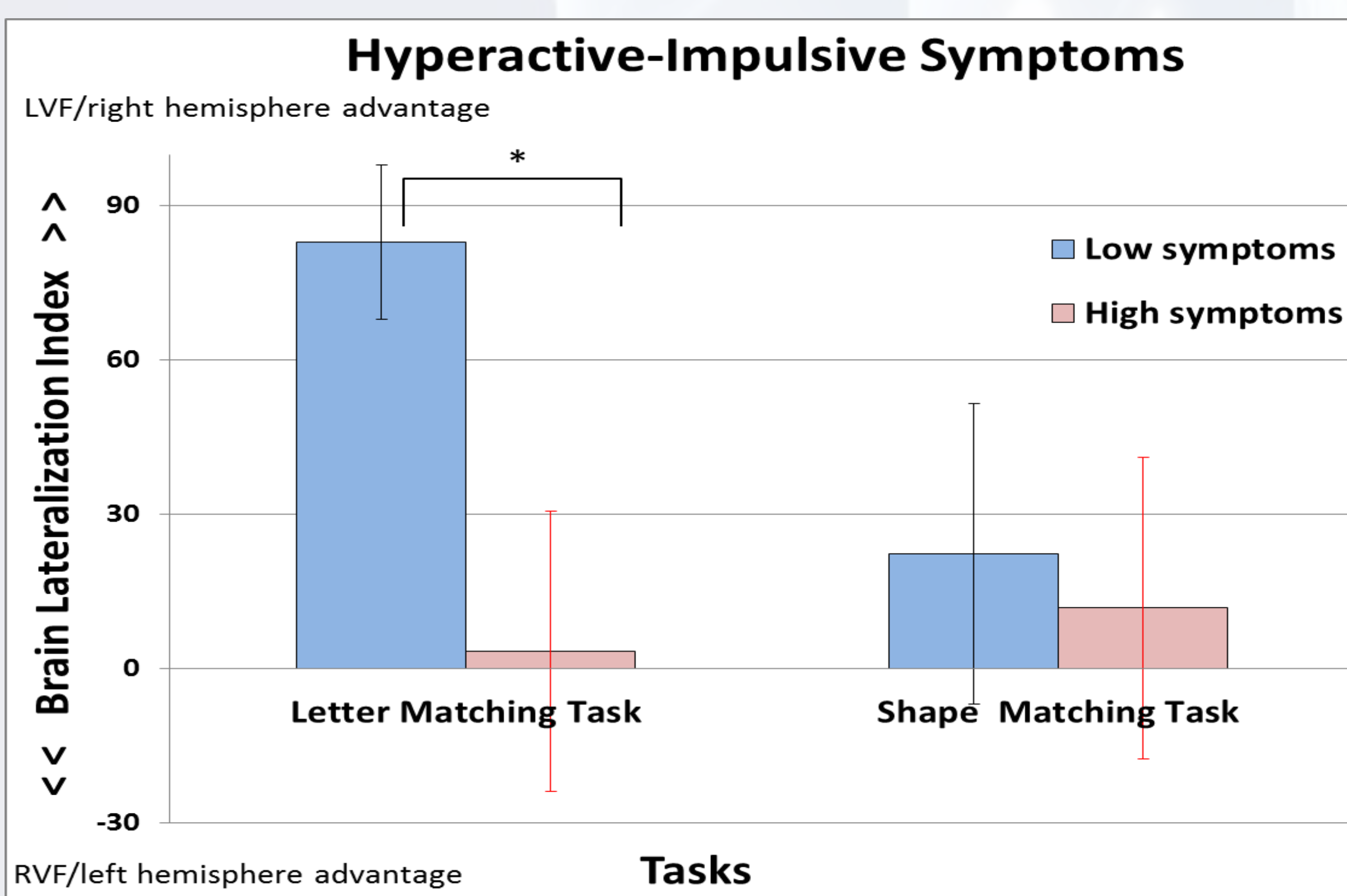


Figure 2

Conclusion

The present findings from non-clinical adults support the dimensionality of right hemisphere deficit and high lateralized verbal processing to the left hemisphere in ADHD.