



## Attentional Processes that Predict Academic Achievement in Children

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### Introduction and Objective

The relationship between Attention Deficit/ Hyperactivity Disorder (ADHD) and poor academic performance in children has been well established (Loe & Feldman, 2007; Martin, 2014). Results from a meta-analysis of academic achievement performance for individuals with ADHD found the average achievement standard score was 89 (Frazier, Youngstrom, Glutting, & Watkins, 2007).

The three element attentional model conceptualizes attention as a process that consists of distinct mental abilities: focus, sustain, and shift (Mirsky, Anthony, Duncan, Ahearn, & Kellam, 1991). The Test of Everyday Attention for Children (*TEA-Ch*) was constructed according to this theory (Manly, Robertson, Anderson, & Nimmo-Smith, 1999). Few performance-based measures of attention are available to measure each of these three attentional areas, making the *TEA-Ch* a unique tool.

For this study, it was hypothesized that selective and sustained attention would predict performance on measures of reading and writing. Selective attention and attentional control/switching were hypothesized to contribute to success in mathematics.

### Method

#### Participants and Setting

This study incorporated archival data from the KIDS, Inc. School Neuropsychology Post-Graduate Certification Program. Children with a clinical diagnosis of ADHD ( $N=525$ ) were selected. Participants ranged in age from 3 to 21 and 47% of the participants were between age 8 and 11 ( $N=453$ ).

#### Variables and Measures

The *TEA-Ch* was used to assess participants' ability to activate selective, sustained, and divided (switching) attention. Academic achievement was measured with the *Woodcock-Johnson Tests of Achievement, 3<sup>rd</sup> Edition Normative Update* (WJ ACH III-NU). Reading comprehension was measured by two subtests: Passage Comprehension and Reading Vocabulary. Math reasoning was measured by two subtests: Applied Problems and Quantitative Concepts. Written Expression was measured by two subtests: Writing Fluency and Writing Samples. Three stepwise regressions were computed to determine if subtests from the *TEA-Ch* predicted performance in Reading Comprehension, Math Reasoning, or Written

### References

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Manly, T., Robertson, I. H., Anderson V. & Nimmo-Smith, I. (1999). The Test of Everyday Attention for Children (TEA-Ch). Pearson: San Antonio, TX.

Martin, A. J. (2014). The role of ADHD in academic adversity: Disentangling ADHD effects from other personal and contextual factors. *School Psychology Quarterly, 29*(4), 395-408.

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### Results

	Reading				Writing				Math			
	b	SE-b	$\beta$	p	b	SE-b	$\beta$	p	b	SE-b	$\beta$	p
<b>Selective Attention</b>												
<i>Sky Search</i>	.447	.189	.105	.018*					.641	.147	-.192	.000*
<i>Map Mission</i>												
<b>Sustained Attention</b>												
<i>Sky Search DT</i>												
<i>Score!</i>					.441	.238	.100	.048*	.792	.167	.233	.000*
<i>Score! DT</i>												
<i>Walk, Don't Walk</i>					-1.187	.181	-.284	.000*	-3.883	.129	-.127	.003*
<i>Code Transmission</i>	-.589	.140	-.178	.000*	-.554	.175	-.154	.002*	-.784	.123	-.302	.000*
<b>Attentional Control/ Switching</b>												
<i>Creature Counting</i>	1.386	.251	.247	.000*	.622	.272	.101	.023*	.763	.199	.173	.000*
<i>Opposite Worlds</i>	-.578	.223	-.111	.010*								

\* Indicates  $p < .05$

The nine attentional subtests from the *TEA-Ch* were entered simultaneously as the predictor/independent variables. Each academic achievement cluster (Reading Comprehension, Math Reasoning, and Written Expression) was entered separately as the outcome/dependent variable. Results indicated academic achievement clusters were predicted by select *TEA-Ch* subtests that measure selective and sustained attention, and attentional control.

#### Reading Comprehension

Code Transmission ( $\beta = -.178, p < .001$ ), Creature Counting ( $\beta = .247, p < .001$ ), Opposite Worlds ( $\beta = -.111, p < .05$ ), and Sky Search ( $\beta = .105, p < .05$ ) explained 10% of the variance in Reading Comprehension,  $F(4, 525) = 15.28, p < .001, R^2 = .105$ .

#### Written Expression

Walk, Don't Walk ( $\beta = -.284, p < .001$ ), Code Transmission ( $\beta = -.154, p < .01$ ), Score! ( $\beta = .100, p < .05$ ), and Creature Counting ( $\beta = .101, p < .05$ ) explained 10% of the variance in Written Expression,  $F(4,525) = 14.83, p < .001, R^2 = .102$ .

#### Math Reasoning

Code Transmission ( $\beta = -.302, p < .001$ ), Score! ( $\beta = .233, p < .001$ ), Creature Counting ( $\beta = .173, p < .001$ ), Sky Search ( $\beta = -.192, p < .001$ ), and Walk, Don't Walk ( $\beta = -.127, p < .01$ ) explained 15% of the variance in in Math Reasoning,  $F(5,525) = 18.83, R^2 = .153$ .