

# Neurocognitive Predictors of Academic Functioning in Childhood ADHD

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## Introduction

### Academic Impairment

- ~33-63% of children with ADHD exhibit significant academic impairment (Mayes & Calhoun, 2006).
- Above estimates suggest significant heterogeneity in academic outcomes.
- What are the mechanisms and processes associated with this heterogeneity?
- Impairments (e.g., academic) may predict long-term clinical outcomes better than the core ADHD symptoms (Pelham et al., 2005).

### Neurocognitive Mechanisms

- In developmental samples, neurocognitive abilities predict academic outcomes (Swanson & Kim, 2007; Thorell, 2007).
- Many but not all children with ADHD exhibit neurocognitive and/or academic deficits (Rapport et al., 2013).
- Working memory:** promising candidate to explain academic impairment and heterogeneity.
- WM is associated with reading, math, and overall academic achievement among children with ADHD (Alloway & Stein, 2014; Mayes & Calhoun, 2007; Rogers et al., 2011).

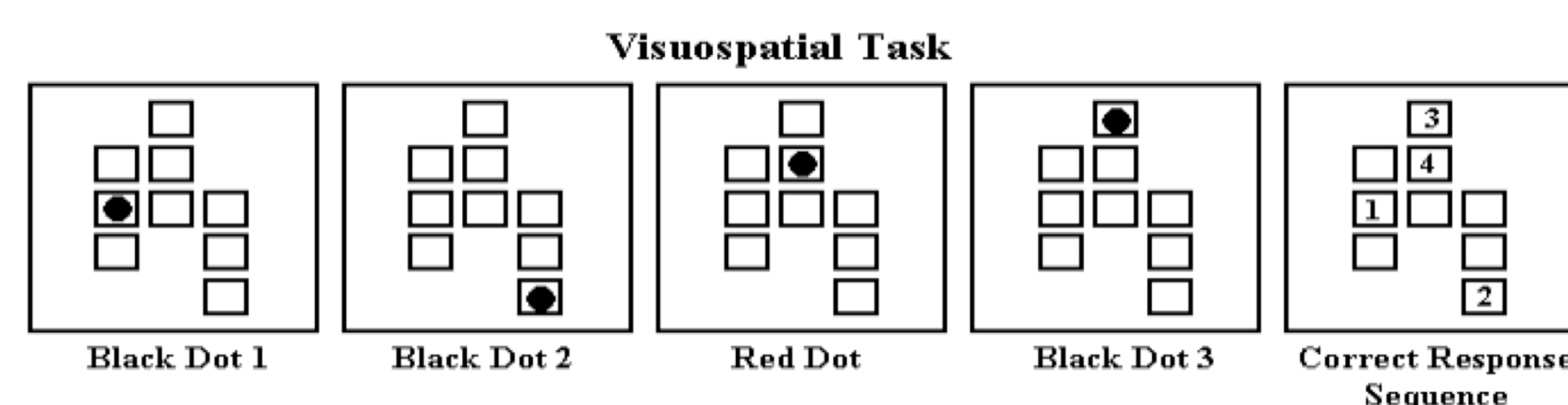
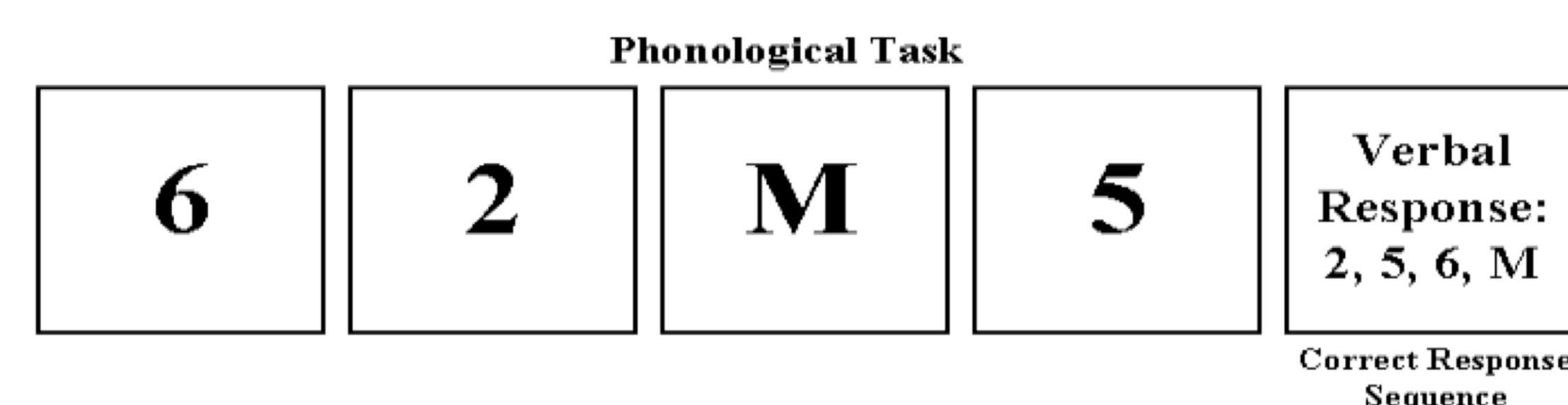
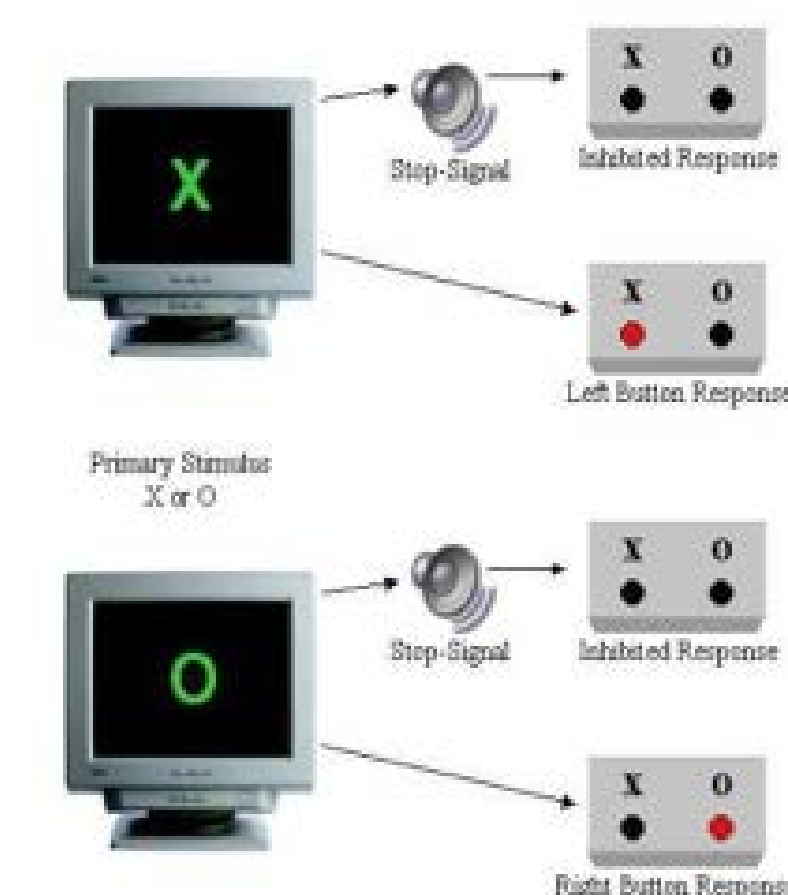
## Method

### Participants

- 8-13 year old children
- Carefully diagnosed ADHD
- $N = 47$

### Measures

- Kaufman Test of Educational Achievement (KTEA) - 2<sup>nd</sup> or 3<sup>rd</sup> edition
  - Overall Academic Composite
  - Reading Composite
  - Math Composite
  - Writing Composite
- Stop-Signal Task
  - Behavioral Inhibition
  - Processing Speed
- Phonological WM and Visuospatial WM tasks (Rapport et al., 2008)



## Results

- Regression models for each academic domain were significant for reading, math, written language, and overall academic performance ( $R^2 = .26$  to  $.41$ ).
- PHWM and VSWM both uniquely predicted performance on the reading, math, written language, and overall academic composites ( $\beta_{\text{range}} = .34$  to  $.48$ , all  $p < .05$ ).
- BI and PS failed to uniquely predict academic achievement overall or in any assessed domain.

Figure 1. Multiple Regression Model for Overall Academic Battery Score

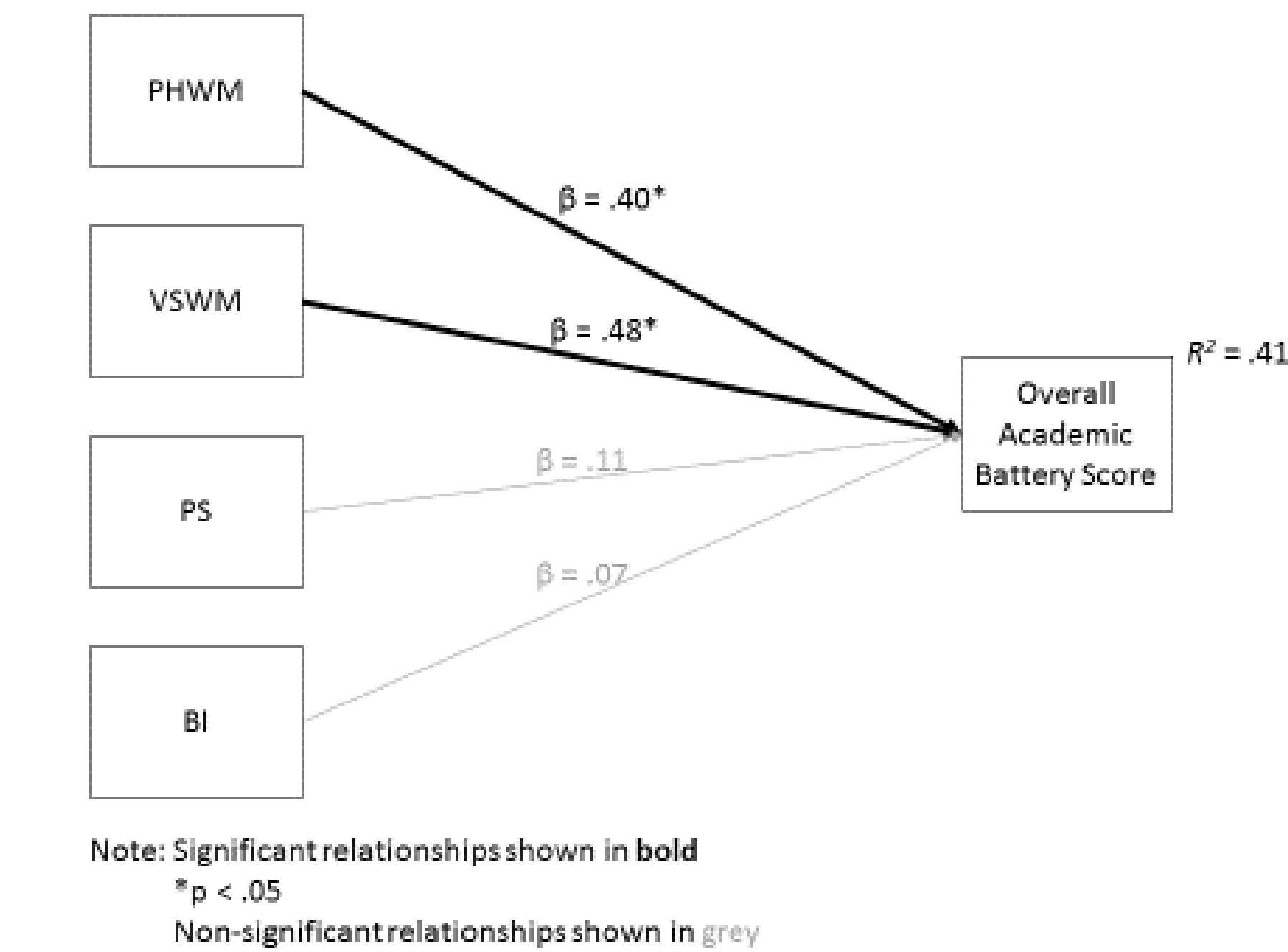


Figure 2. Multiple Regression Model for Reading Composite

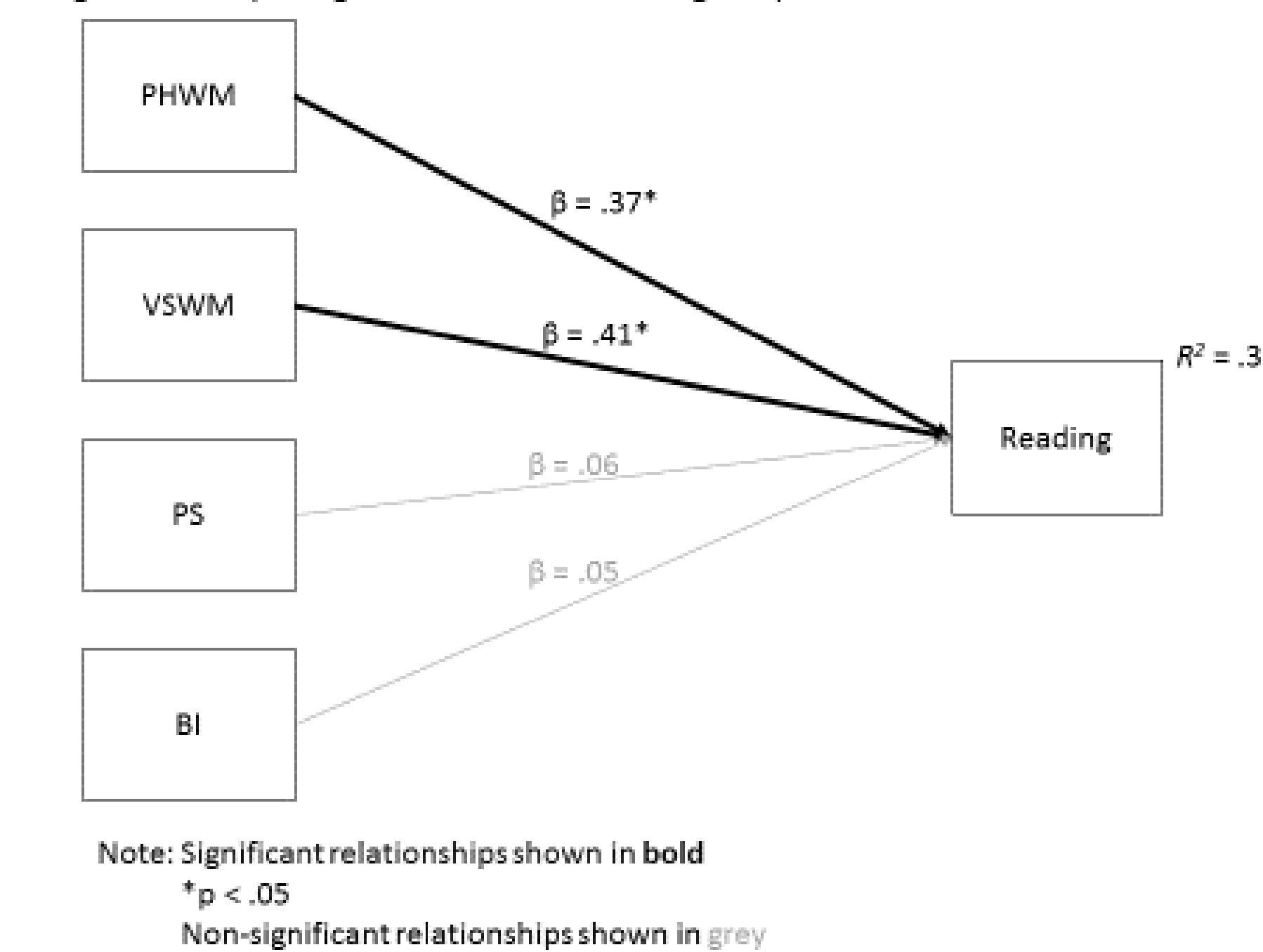


Figure 3. Multiple Regression Model for Math Composite

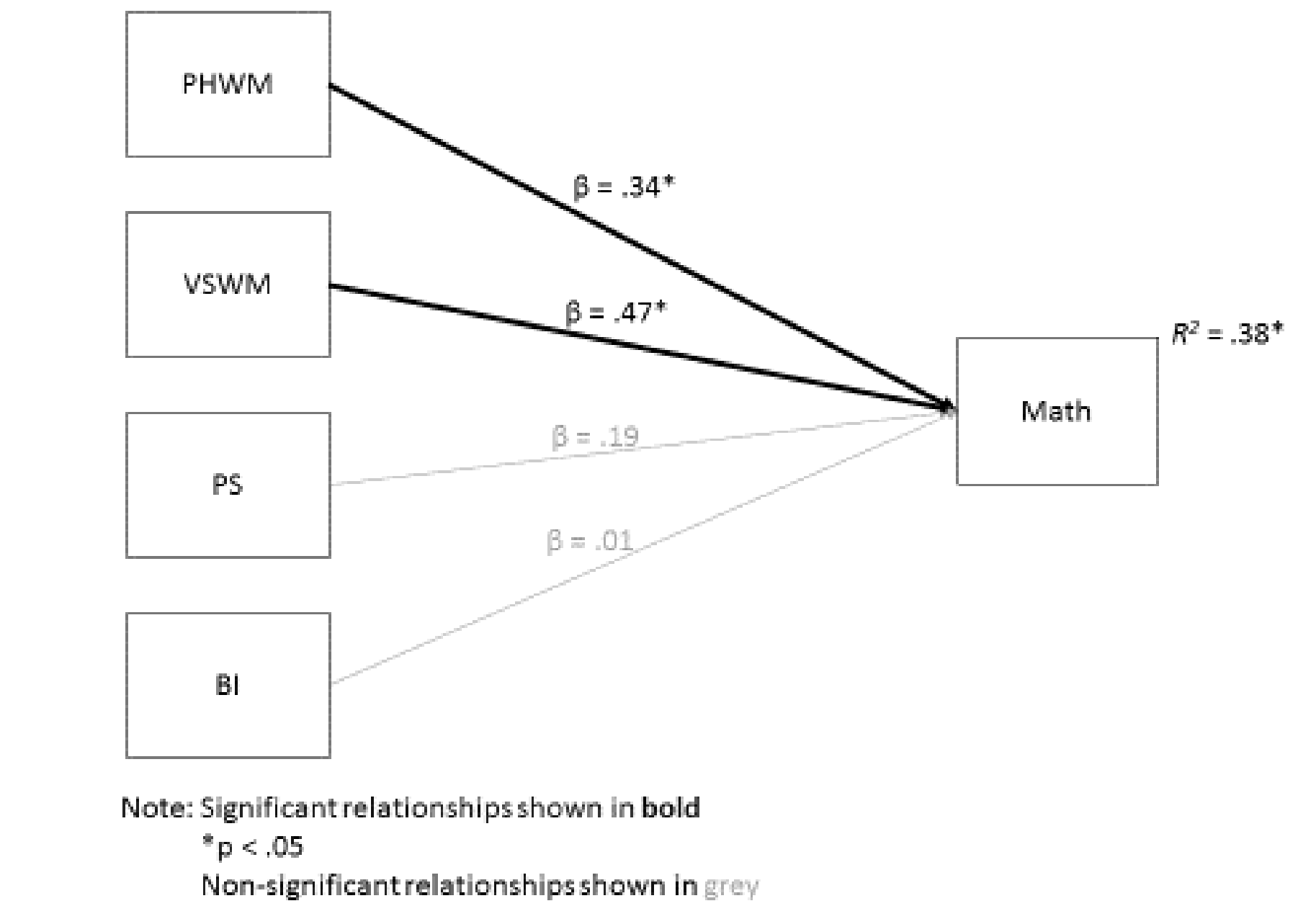
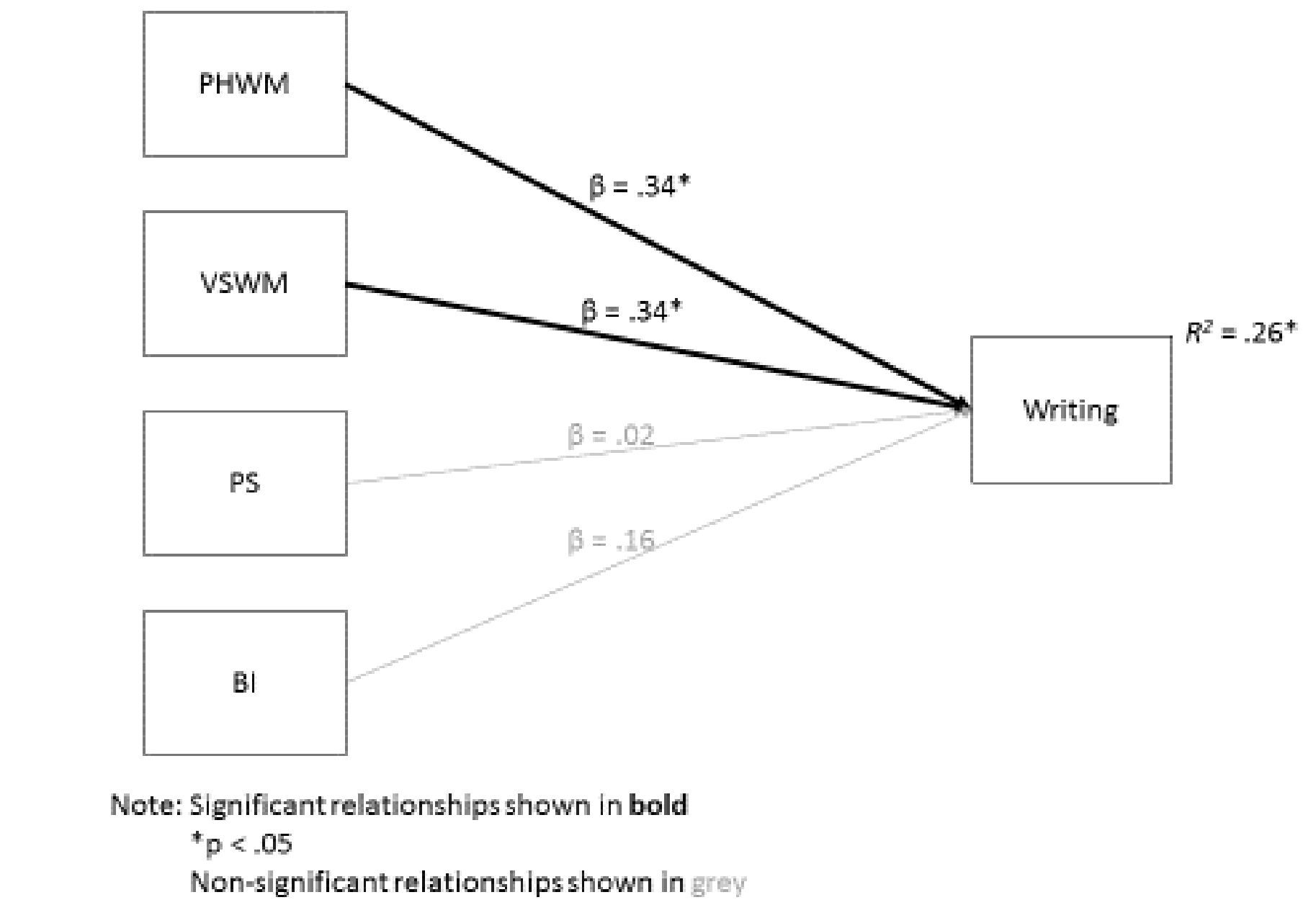


Figure 4. Multiple Regression Model for Writing Composite



## Conclusion

- Working memory (PH and VS) emerged as a unique neurocognitive predictor of academic achievement.
- Our findings are consistent with meta-analytic findings of large magnitude working memory deficits in ADHD based on best case analysis ( $d \geq 2.0$ ; Kasper et al., 2012).
- Working memory deficits may be implicated in broad-based academic impairment in ADHD.
- Interventions that improve working memory may be able to target this important mechanism associated with academic underperformance.
- Working memory may be an appropriate target for novel treatment approaches for ADHD.

## References

See supplemental handout.