Examining the Validity of the NIH Toolbox List Sorting

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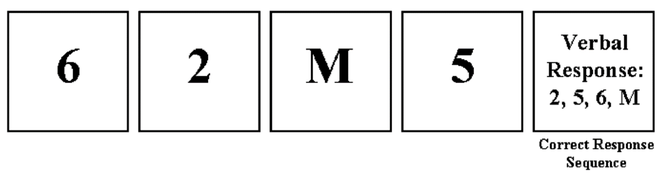
INTRODUCTION

- Children with attention and behavior problems have well-documented deficits in working memory (WM).
- Measures of WM primarily include experimental laboratory tasks and standardized neuropsychological tests, yet head-to-head comparisons of these two types of tasks are lacking.
- **The current study will evaluate the sensitivity and concordance of experimental WM paradigms and the List Sorting task from the NIH Cognitive Toolbox**
  - **Aim 1:** Examine the relation between the NIH LS task and well-developed laboratory measures of phonological and visuospatial working memory
  - **Aim 2:** Estimate the magnitude of between-group performance differences (disruptive behavior problems vs. typically developing) on experimental WM tasks and the NIH LS task
  - **Aim 3:** Evaluate the extent to which scores on the experimental WM tasks and the NIH LS task predict symptoms of inattention and hyperactivity/impulsivity in children with and without disruptive behavior problems
- **Hypotheses:** We expect the NIH LS task to be moderately associated with both experimental tasks and that both tasks will significantly predict continuous symptoms of ADHD. Further, we expect that the NIH LS task to be less sensitive than the laboratory WM tasks, such that the experimental tasks will exhibit larger diagnostic group differences and stronger associations with dimensional symptoms.

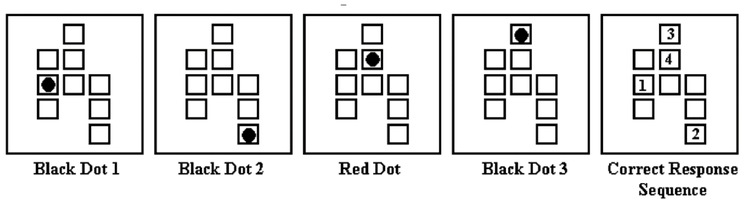
METHOD

- **Participants:**
  - **Children in the disruptive behavior problem (DBP) group** were enrolled in a summer treatment program for children with attention, learning, and behavioral difficulties
  - **Children in the typically developing (TD) group** 1) had no evidence of a clinical disorder, 2) typical developmental history, and 3) < six symptoms endorsed on the DBD

Phonological Working Memory



Visual Spatial Working Memory

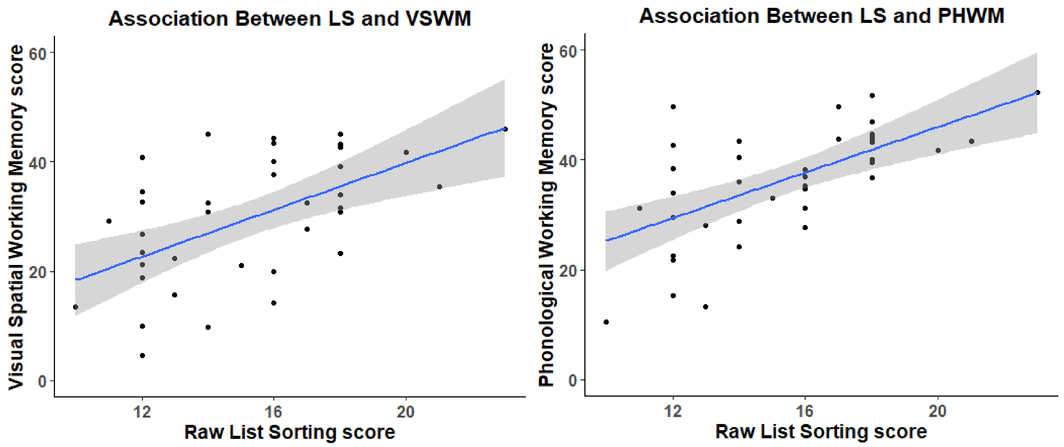


NIH List Sorting

RESULTS

Sample Characteristics			
	DBP (*n* = 19)	TD (*n* = 20)	*p*
Age, *M* (SD)	9.63 (1.67)	10.34 (1.11)	.13
Sex, M:F	15:3*	10:10	.07
Race, % Caucasian	88%**	79%	.83
Ethnicity, % Hispanic	81%**	95%	.47
DBD, total symptoms	19.74 (5.39)	3.00 (4.81)	<.001

*One child missing biological sex; ** Three children missing race and ethnicity



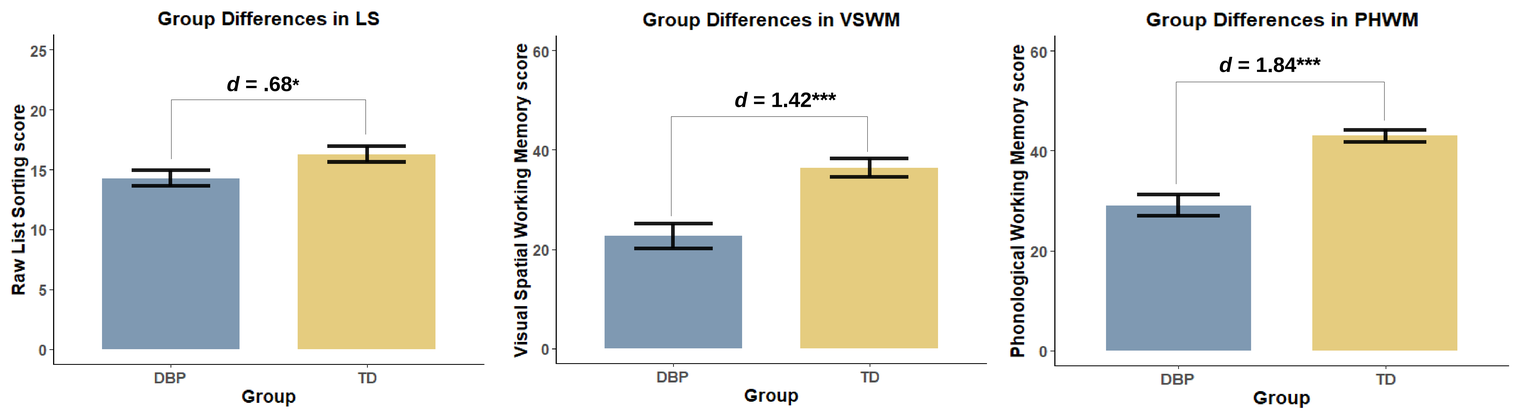


Table 1. Working Memory Performance Predicting Scores on the DBD

Tier Three	DBD	*p*-value	R^2
List Sorting, *b* (SE)	-1.14 (.53)	.04	.10
Visual Spatial WM, *b* (SE)	-.46 (.12)	<.001	.28
Phonological WM, *b* (SE)	-.60 (.13)	<.001	.40

DISCUSSION

- The LS task was associated with PHWM and VSWM indicating that the LS task captures variance associated with the underlying construct of working memory
- The largest magnitude between-group differences in WM were observed for the PHWM and VSWM tasks, suggesting increased sensitivity in those tasks for detecting differences in impaired and non-impaired groups of children
- All three tasks were associated with symptoms of ADHD
- The 'all-or-nothing' scoring approach utilized on the LS task may reduce the overall sensitivity of the task to detect between-group differences and relate working memory performance with other constructs (e.g., symptom ratings) consistent with past work
- Experimental paradigms may be most useful for capturing subtle group differences and variation in WM abilities across typically-developing and clinical populations