

Upset and Unfocused: ADHD symptoms and cognitive abilities as moderators for working memory performance under varying levels of emotional load

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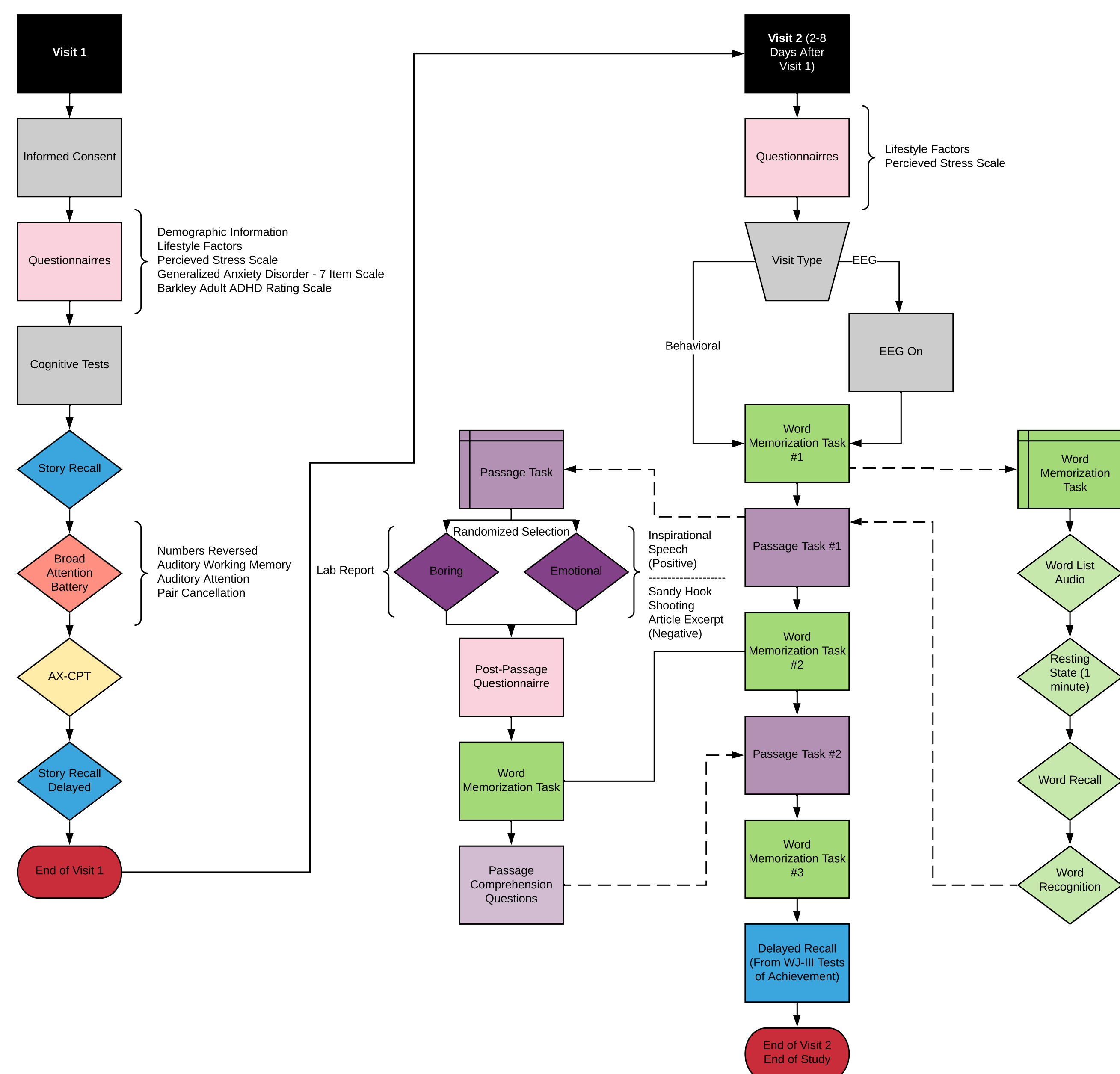
BACKGROUND

- ADHD symptoms are prevalent among college students and frequently cause executive function (EF) impairments
- While EF impairments are well-studied in this population, the interaction between emotional arousal/mood, working memory (WM), ADHD symptoms and cognitive abilities (CA) remains unclear
- OBJECTIVE:** This study aimed to investigate the interplay between ADHD symptomatology and cognitive abilities, working memory in word-memorization, and emotional load

METHODS

Study Design

- Undergraduate participants between the ages of 18-25 were recruited from the UMD Psychology SONA system for this two-part study
- Figure 1 (below) shows the overall study flow:



Measures Used for Current Analyses

- Barkley Adult ADHD Rating Scale (BAARS):** 27-item self-report rating scale of core ADHD symptoms and domains of impairment
- Woodcock-Johnson III, Tests of Cognitive Abilities (WJ), Broad Attention Battery:** four subtests (Numbers Reversed, Auditory Working Memory, Auditory Attention, and Pair Cancellation) that measure cognitive EF (WM/attention) abilities
- Word Lists:** three 20-word recall and associated recognition lists (composed of words from the recall list and related foils) with short, non-concrete words were presented auditorily as a practical measure of working memory, attention, and EF ability

List A -- Recall		List A -- Recognition		List B -- Recall		List B -- Recognition		List C -- Recall		List C -- Recognition	
Purpose	Belief	Batter	Manner	Sympathy	Extra	Reality	Symphony	Unknown	Appear	Acclimate	Other
Typical	Bother	Curfew	Belief	Capacity	Prestige	Enough	Later	Instance	Value	Justify	Instance
Extent	Patience	Never	Persistence	Wisdom	After	Defeat	Generous	Usual	Hardly	Courage	Boastful
Respect	Ideal	Impulse	Normal	Talent	Every	Delight	Wisdom	Aspect	Estimate	Memory	Nearly
Manner	Impulse	Rapidly	Sister	Generous	Failure	Every	Achievement	Memory	About	Provision	Hardly
Latter	Loyalty	Authentic	Extent	Vague	Reality	Plague	Distinct	Other	Effort	Usual	Worth
Never	Mercy	Theory	Ideal	Ability	Enough	Without	Extra	Opinion	Because	Theater	Prospect
Normal	Virtue	Admire	Intuition	Distinct	Delight	Valiant	Denotive	Decision	Himself	Effort	Career
Genuine	Quickly	Royalty	Mercy	Success	Without	Emotion	Ability	Social	Justify	Thought	Being
Insight	Theory	Typical	Carpus	Motive	Feeling	Excitement	Audacity	Courage	Concert	Himself	Unknown

- Passages:** two passages (neutral biology lab report, and either inspirational poem or school shooting news article) were played between trials to manipulate emotional load

RESULTS

Woodcock-Johnson Cognitive Abilities groups were composed of the bottom and top thirds of the sample

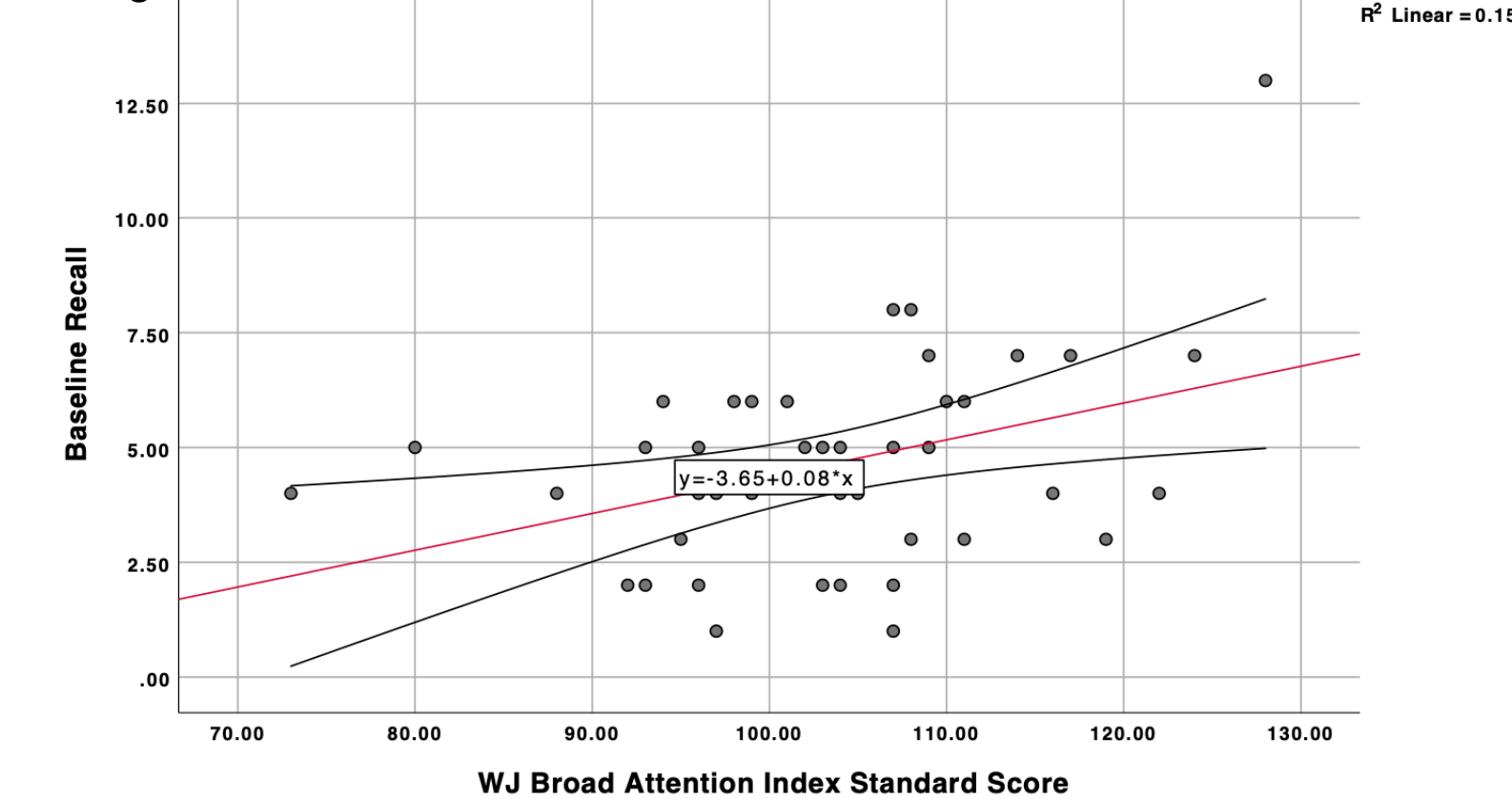
Figure 2: WJ Cognitive Abilities Groups	N (%)	Mean (SD)
Working Memory Index -- High	17 (34%)	123.41 (7.37)
Working Memory Index -- Low	17 (34%)	95.88 (5.49)
Broad Attention Index -- High	17 (34%)	116.24 (8.41)
Broad Attention Index -- Low	17 (34%)	91.41 (6.43)

Figure 3: Correlation Between WJ Working Memory Score and Baseline Recall



Positive correlation between working memory standard scores and baseline recall ($r=.39$, $P=.01$)

Figure 4: Correlation Between WJ Broad Attention Score and Baseline Recall

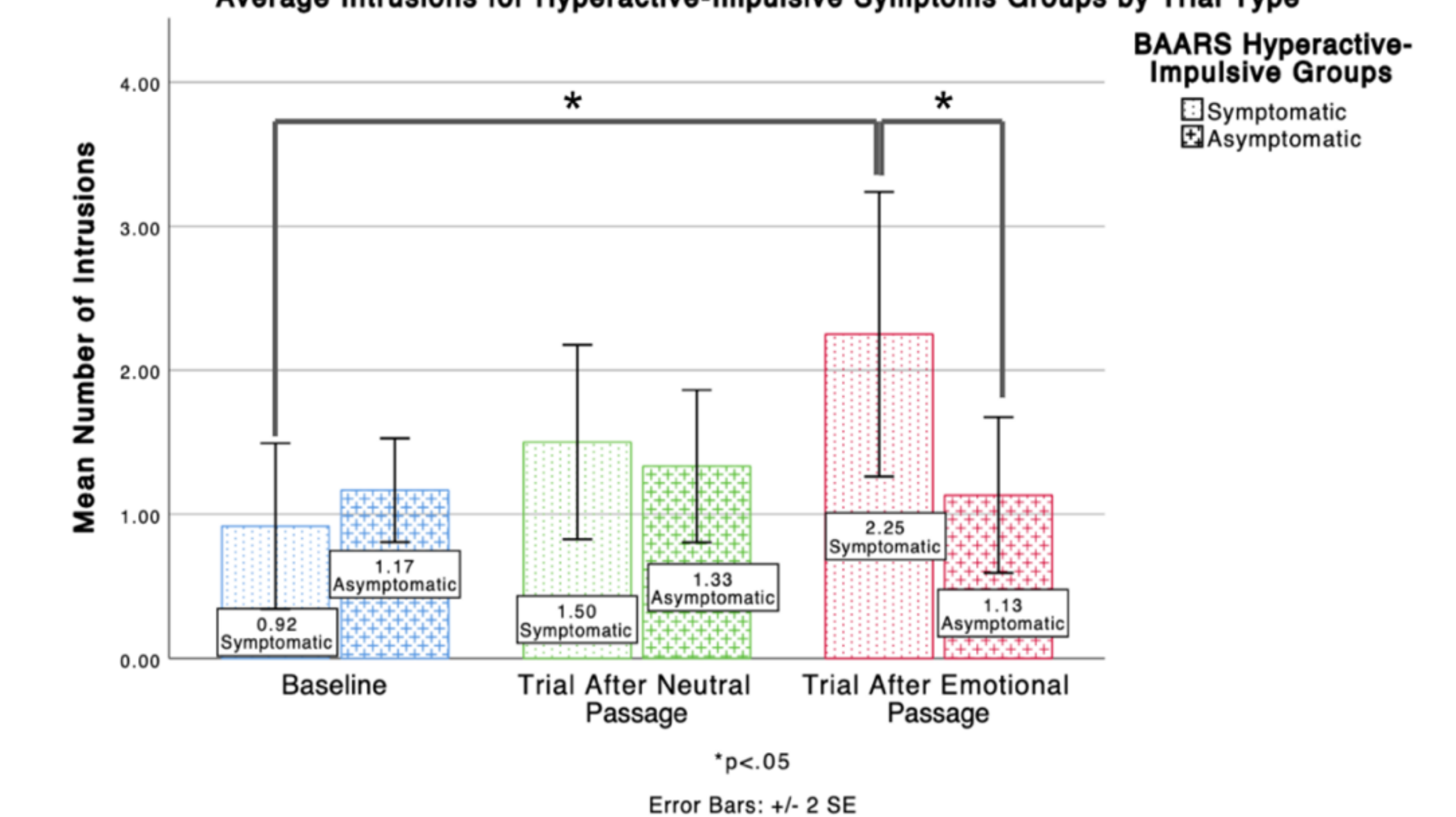


Positive correlation between broad attention standard scores and baseline recall ($r=.39$, $P=.01$)

Figure 5: BAARS Symptomatic and Asymptomatic Groups	N (%)
Symptomatic Inattention Group	17 (34%)
Asymptomatic Inattention Group	27 (54%)
Symptomatic Hyperactive-Impulsive Group	14 (27%)
Asymptomatic Hyperactive-Impulsive Group	33 (66%)
Symptomatic ADHD Group	14 (27%)
Asymptomatic ADHD Group	26 (52%)
Symptomatic Sluggish Cognitive Tempo Group	16 (32%)
Asymptomatic Sluggish Cognitive Tempo Group	24 (48%)

BAARS Symptomatic and Asymptomatic Groups were composed of participants above the 93rd percentile on either the subscore or symptom count, or below the 73rd percentile, respectively

Figure 6: Average Intrusions for Hyperactive-Impulsive Symptoms Groups by Trial Type



- As seen in Figure 6, participants in the hyperactive-impulsive Symptomatic group produced more intrusions on the trial after the emotional passage than Asymptomatic peers ($t=2.11$, $P=.04$)
- Furthermore, these Symptomatic participants also provided more intrusions in the trial after the emotional passage as compared to their baseline trial ($t=3.08$, $P=.01$)

CONCLUSIONS

- College students in this sample with high hyperactive-impulsive ADHD symptoms performed worse on the self-regulatory EF aspects of the word memory task, including producing higher levels of intrusions in the trial after the emotional passage
- This is unlike the deficits shown by the cognitive abilities groups, which were more closely tied to overall task performance ability
- Results further confirm that the WJ cognitive tests and BAARS questionnaire are not detecting the same characteristics of executive function – or lack thereof

This study was partially funded by an undergraduate research grant from the University of Maryland Individual Studies Program