

Investigating tactile attention in adults with ADHD using EEG



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Background

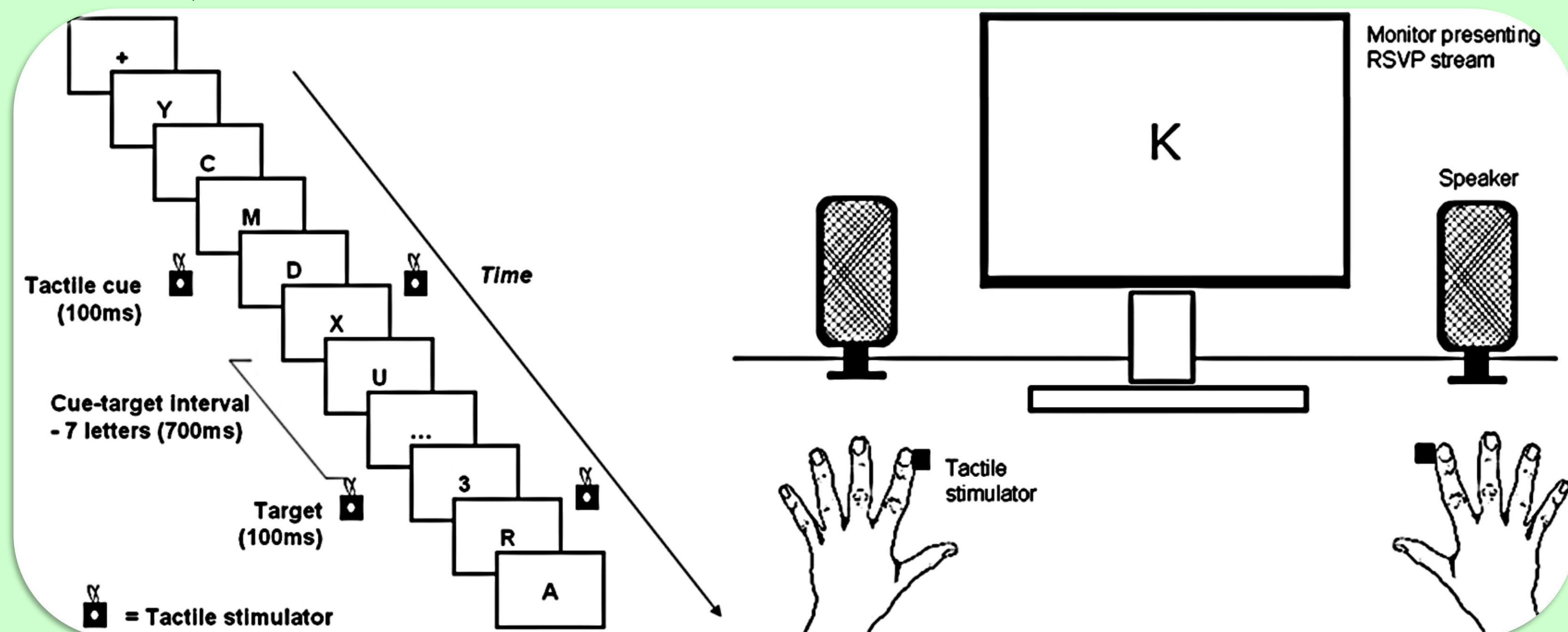
- Attention refers to the cognitive ability to focus and concentrate on relevant incoming stimuli (Heitz and Engle, 2007).
- In the tactile domain, we constantly need to filter out irrelevant information. It has been suggested that Attention-deficit/hyperactivity disorder (ADHD) is characterized in part by an increased sensitivity to incoming stimuli (Panagiotidi, Overton and Stafford, 2018).
- However, there has been limited scientific research that has investigated how tactile attention is processed in people with ADHD.

Aim

- The current study endeavors to provide a greater understanding of how tactile attention is processed in individuals with ADHD compared to neurotypical individuals.
- The primary objective of the study is to explore potential differences in behavior and neural markers between ADHD and neurotypical individuals.

Methods

- 39 Participants (17 ADHD, 18 Typical), 18-35 years old
- Questionnaires: General background information, Autism Spectrum Quotient (AQ), Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist
- Based on the Jones and Forster (2013) study, 3 Tasks: single-tactile, single-visual, dual (tactile and visual)

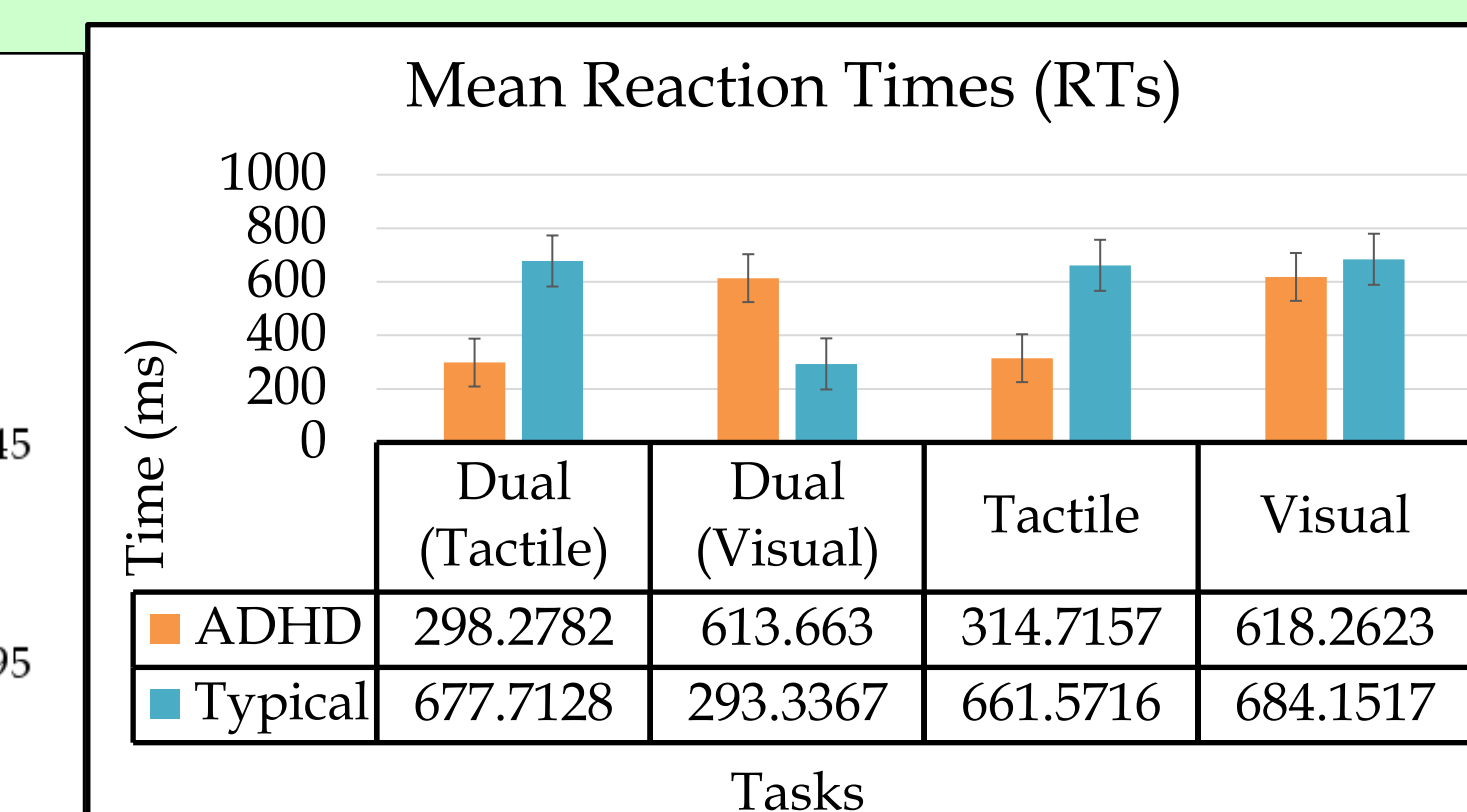
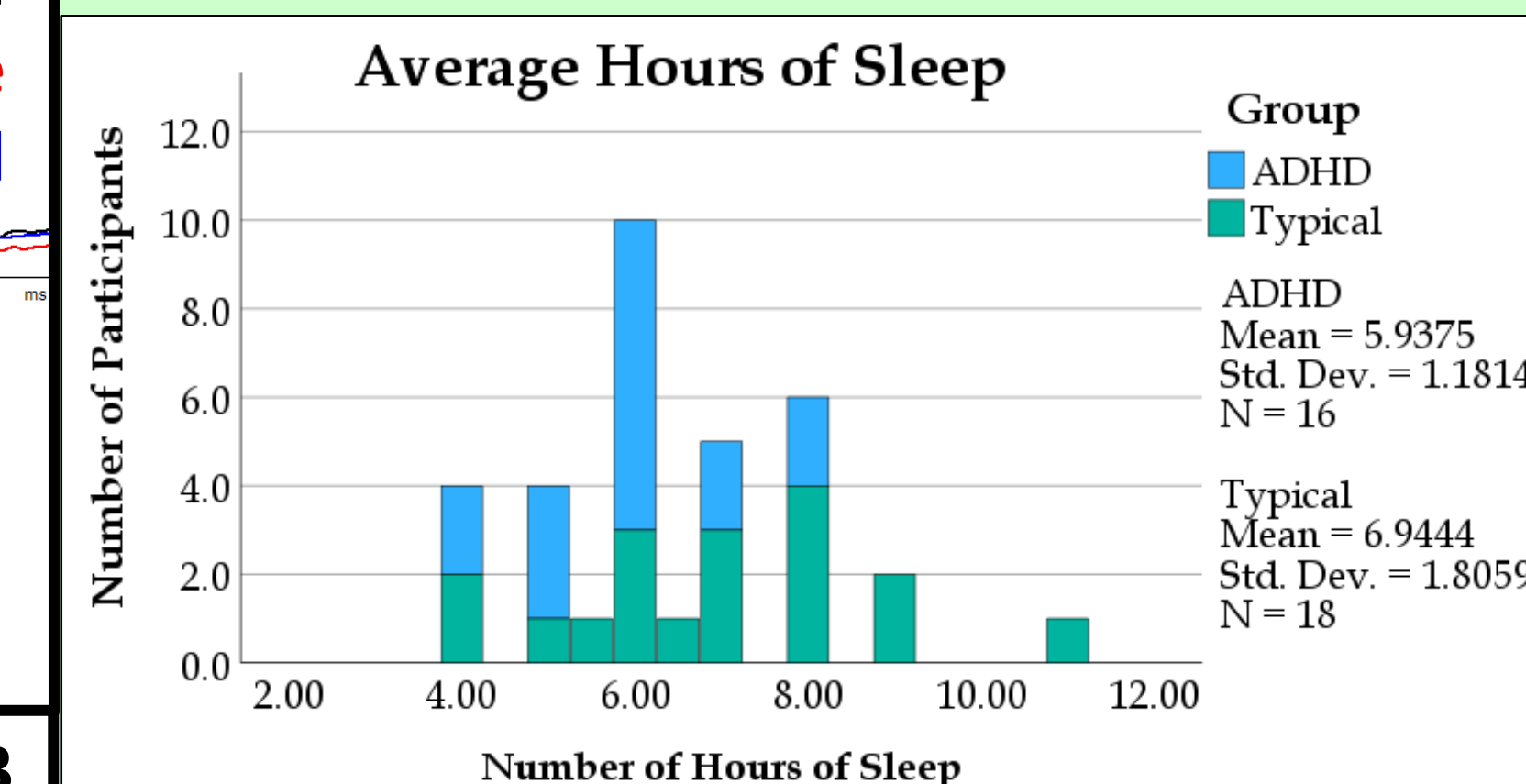
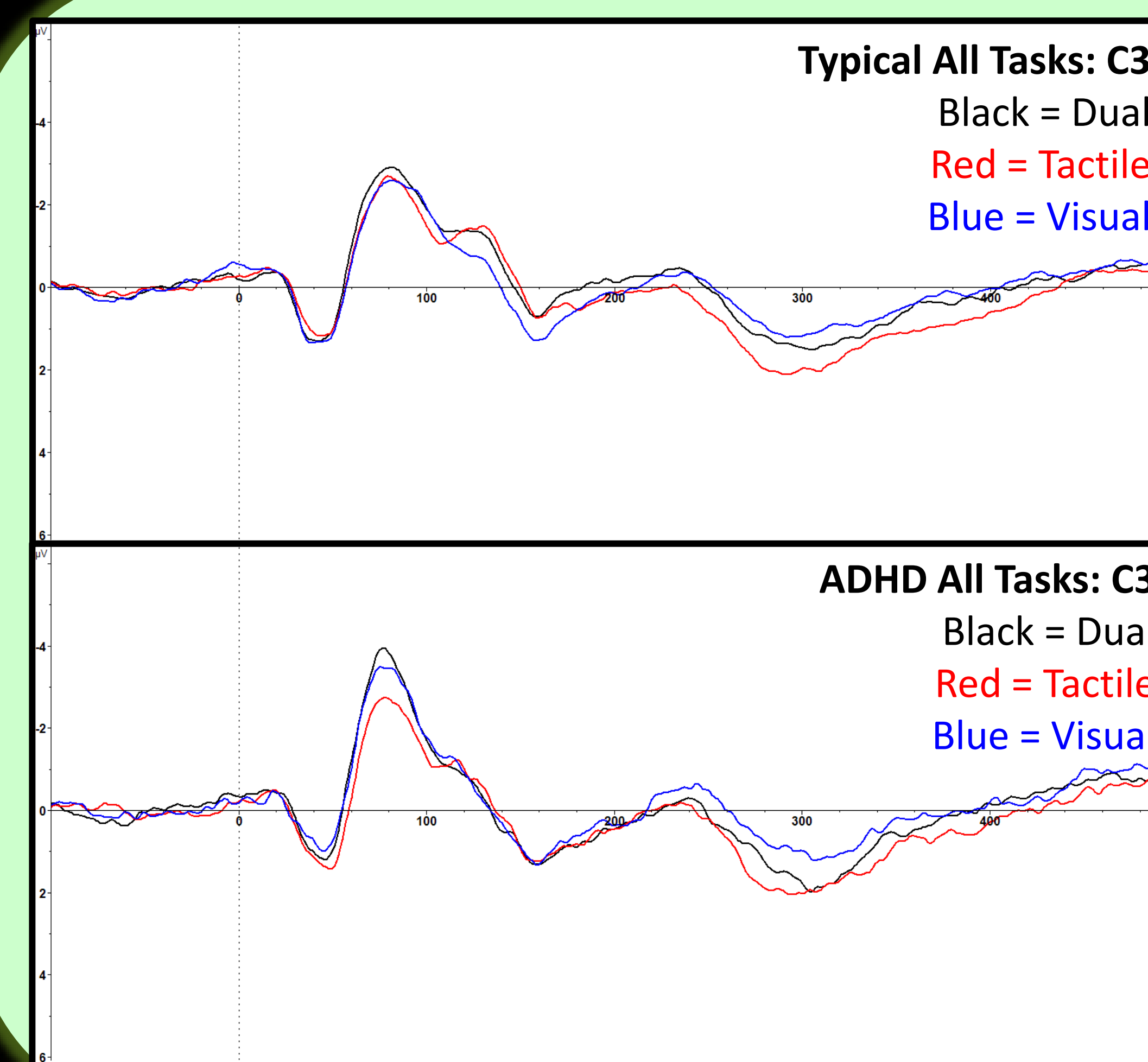


Groups	ADHD	Employment Status				Total	Education		Quality of sleep			
		Employed	Self-employed	Student	Unemployed		ADHD	Typical	ADHD	Typical		
	ADHD	6	5	5	1	17	Secondary	1	0	Very good	2	3
	Typical	5	2	10	1	18	6th form	7	8	Good	4	4
							Bachelors	7	7	Average	6	9
							Masters	2	3	Poor	4	2
										Very poor	1	0
	Total	11	7	15	2	35						

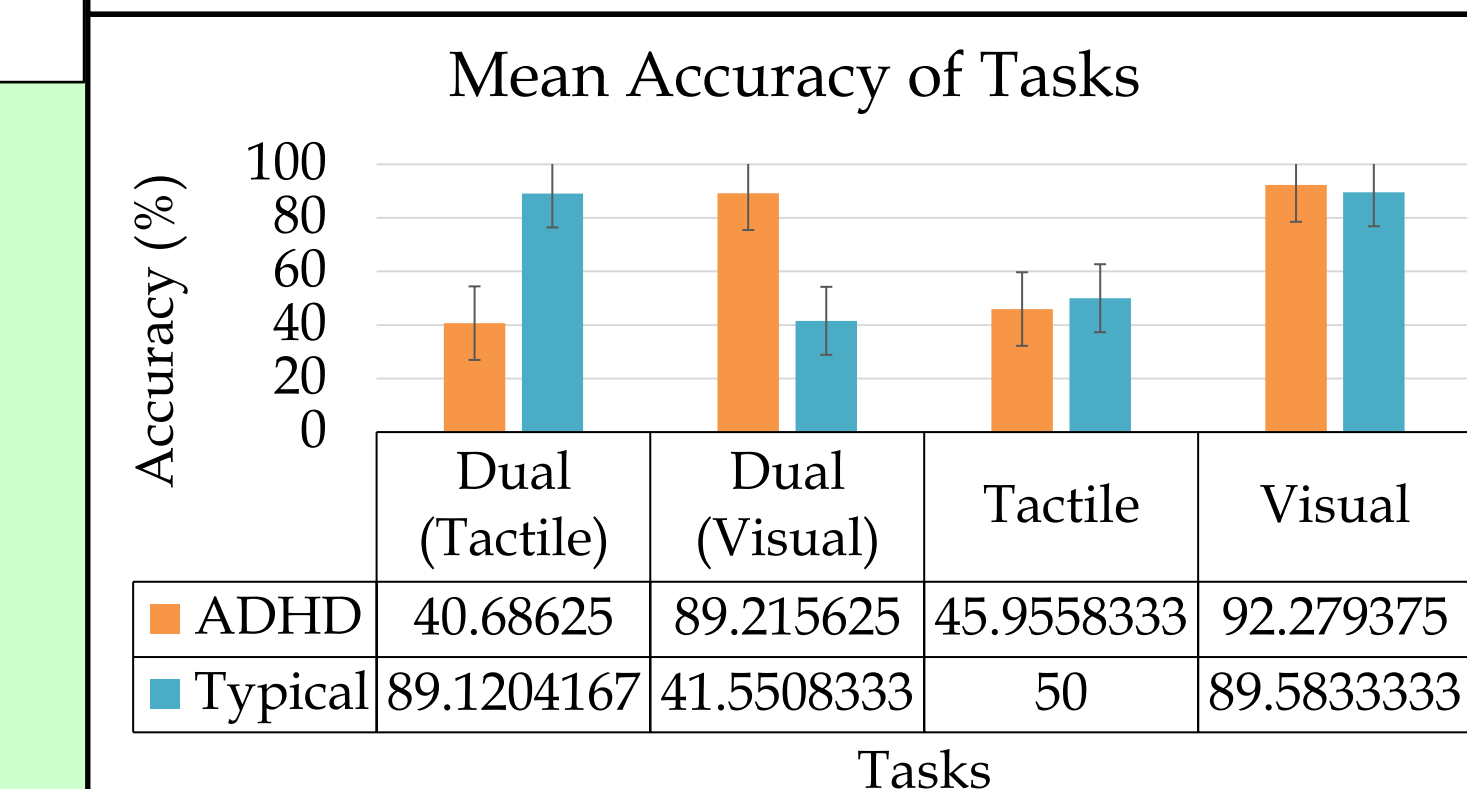
Hypotheses

- Hypothesis 1: the distractors will have a greater impact on the attention of the ADHD group than the control group. An analysis of the ERPs for the control and ADHD will determine this.
- Hypothesis 2: there will be a significant difference between the tasks. A paired samples t-test will be employed to analyze each task individually. Analysis will be used to examine if: The control group will have a faster reaction time than the ADHD group for the tasks (single tactile, single visual, dual). The control group will have higher accuracy than the ADHD group for the tasks (single tactile, single visual, dual).
- Hypothesis 3: there will be a significant difference between the spatial conditions in terms of accuracy. A paired samples t-test will examine this. Analysis will also be used to examine if: The control group will have greater reaction times than the ADHD group for both the cued and uncued trials.
- Null Hypothesis: overall, there will be no statistically significant differences between the control and ADHD groups.

Results



Comorbidity	# ADHD	# Typical
Anxiety	2	0
Dyslexia	2	0
Dyspraxia	1	0
Diabetes	1	0
Depression	1	0
HSD	1	0
PTSD	1	0
Asthma	1	0
Eczema	1	0
Bilateral Cataracts	0	1



Discussion and Conclusions

- The single versus dual task performance reveals that cognitive challenges significantly impact how the brain handles information at different stages. This suggests that the brain may shift its cognitive resources or change its processing methods when faced with more complex tasks.
- The ADHD group showed faster RTs in tactile tasks compared to the typical group and showed similar accuracy in visual tasks. This indicates that both sensory modalities can serve as strengths when tasks are simple. However, ADHD individuals may struggle with more complicated visual tasks.
- ADHD individuals show a speed-accuracy trade-off. They respond quickly but are less accurate when doing two tasks at once, suggesting that their impulsivity may impede thorough cognitive processing.
- The decrease in accuracy seen when multitasking highlights the need for educational and occupational environments to reduce multitasking demands to improve performance among those with ADHD. Providing support for tasks that require dual processing may mitigate errors, and implementing strategies that promote a careful approach could address the speed-accuracy trade-off often faced in these situations.

References

- Heitz, R. P., & Engle, R. W. (2007). Focusing the Spotlight: Individual Differences in Visual Attention Control. *Journal of Experimental Psychology: General*, 136(2), 217-240. 10.1037/0096-3445.136.2.217
- Jones, A. and Forster, B. (2013) 'Lost in vision: ERP correlates of exogenous tactile attention when engaging in a visual task', *Neuropsychologia*, 51(4), pp. 675-685 Available at: 10.1016/j.neuropsychologia.2013.01.010.
- Panagiotidi, M., Overton, P. G., & Stafford, T. (2018). The relationship between ADHD traits and sensory sensitivity in the general population. *Comprehensive Psychiatry*, 80, 179-185. 10.1016/j.comppsy.2017.10.008