

GRANT REPORT UPDATE

Determining the Strategies used in the game "Spot the Missing Object (SMO)" by ADHD and Non-ADHD in Children: An Eye-Tracking Technology Study.

Background

Typical evaluations of ADHD consist of behavior self-report rating scales, a measure of cognitive or intellectual functioning, and specific performance measures designed to measure attention. However, some research shows that current performance measures of ADHD have low specificity and sensitivity and are generally not helpful in diagnosing ADHD in adults (Lipszyc & Schachar, 2010). This project is designed to determine if a non-verbal, user-friendly visual search task, combined with eye-tracking technology, can help increase the diagnosis utility of performance-based measures. The study evaluated the effectiveness of Eye-Tracking Technology as a reliable technique to discriminate ADHD in young adults. In specific, we determined if fixation rate (i.e., number of fixations per second) is different between those that have ADHD (meet criteria on the Adult ADHD Self-Report Scale; ASRS) and those with no diagnosis of ADHD while completing a visual search task "Spot the Missing Object."

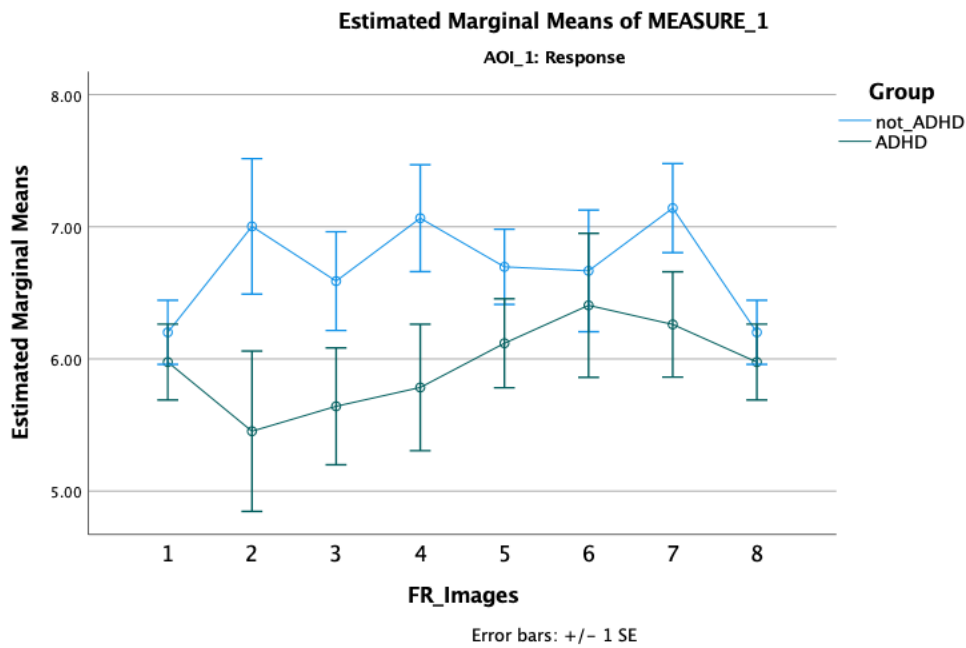
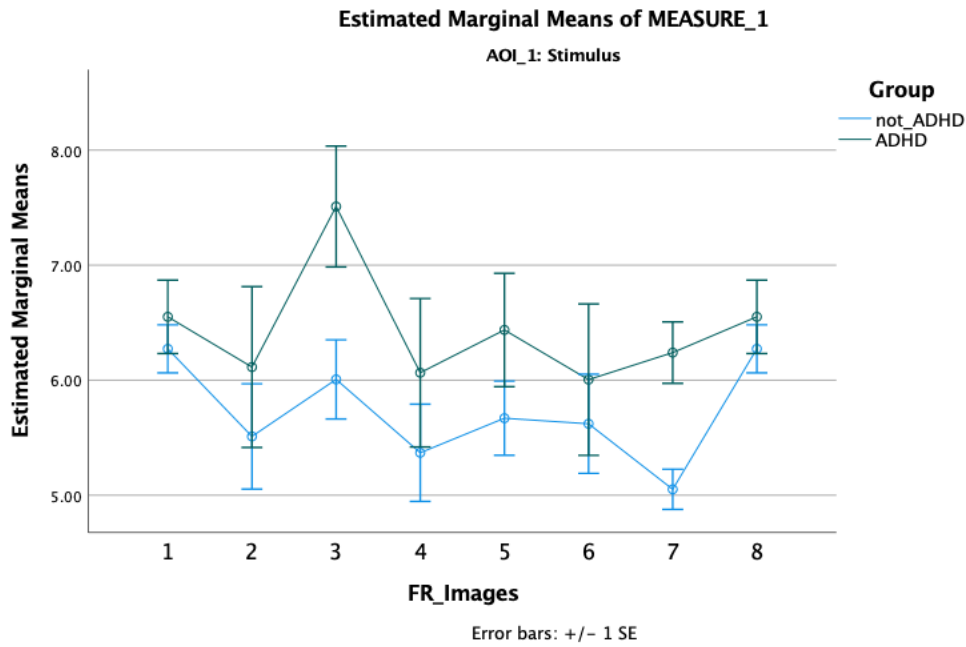
Method

A total of 153 college students participated in this study. To be placed in the ADHD group, a participant must endorse four or more symptoms on the ASRS. To be placed on the non-ADHD, participants should have endorsed 0 ADHD symptoms. Participants that did not meet the above criteria were placed in an Indeterminate group. A total of 29 participants met criteria for ADHD; 45 met criteria for not-ADHD, and 71 were classified as Indeterminate. A total of ten SMO tasks (two were used for practice) were used as the visual picture stimuli. Sticky by Tobii Pro (2020) was used for the collection of eye-movement data was utilized. Sticky by Tobii Pro is an online self-service platform that combines online survey questions with webcam eye-tracking that allow participants to see images from their home computers.

Results

Results indicated significant statistical differences in the total fixation rates for the groups. Out of the 29 participants who met the criteria for ADHD, 10 completed the study with valid eye-tracking data. Out of the 45 participants that met the criteria for not-ADHD, 14 were able to complete the task with acceptable eye-tracking data. Results indicated on the Stimulus picture; participants classified as ADHD had a significantly higher fixation rate (FR) ($M = 6.01$; $SD = .92$) compared to the not-ADHD ($M = 5.64$; $SD = .72$). On the contrary, those classified as ADHD demonstrated a lower FR on the Response picture ($M = 6.30$; $SD = 1.35$) than the not-ADHD ($M = 6.77$; $SD = .77$). Despite the small sample, the results approached statistical significance (p -value range .07 to .13) and showed large effect sizes ($Cohen's D$ range 0.81 to 0.97).

The following figures present Mean Fixation Rate (fixations/sec) by group on stimulus and response images.



The following figures present differences on Heat Maps based on fixations by group for SMO task 7 divided by stimulus and response.

Task 7 Fixation heat Map for the not-ADHD group



Task 7 Fixation heat Map for the ADHD group



Conclusion

The results of this study suggest that eye-tracking technology can potentially help understand the processes that occur during an effortful visual search task and the difference between individuals who have difficulty with attention. In specific to this study, ADHD individuals spent significantly more mental effort (as measured by fixation rate) on learning the image's details (stimulus) than those who do not have ADHD. This result supports the idea that individuals with ADHD generally demonstrate less efficient and slower serial search than the typically developing group, which hinders appropriate responding. This result also supports the idea that individuals with ADHD rely less on working memory when completing a complex task. Thus, eye-tracking technology can give an insight into the strategies that children with ADHD use during relatively engaging tasks.

Budget Update

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772110	22135	150	08/28/21	IPNI	S0756513	AMAZON.COM 290CX8OS1 A	207211	07/03/21	140.00
772110	22135	150	08/28/21	IPNC	S0756489	AMAZON.COM AMZN.COM/BI	207211	08/03/21	-10.00
772110	22135	150	08/28/21	IPNC	S0756482	AMAZON.COM AMZN.COM/BI	207211	08/03/21	-10.00
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773000	22135	150	05/18/21	IPNI	S0730936	AWL PEARSON EDUCATION	207211	04/03/21	120.40
									7,570.40

Presentations and Publications

Aguerrevere, L. E., Flowers, J. M., Gerhold, M., & Martinez, C. (August, 2022). *Determining the Strategies used in the game "Spot the Missing Object (SMO)" by ADHD and Non-ADHD in Children: An Eye-Tracking Technology Study*. To be presented at the Annual American Psychological Association (APA) conference in Minneapolis, MN.