ERRORS ON A GRAPHOMOTOR TRACKING TASK AS A PREDICTOR OF PEDIATRIC ADHD

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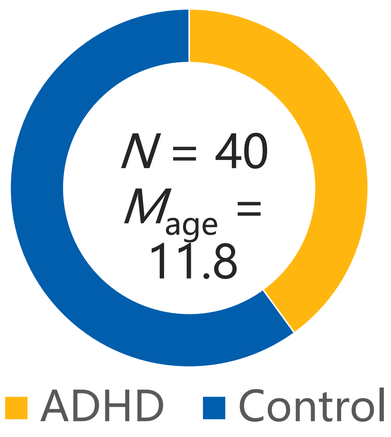
Introduction

- Most neuropsychological measures are unable to discriminate between those with and without ADHD, giving rise to difficulties in clinical decision making.
- Deficits in cognitive control (response inhibition) may underlie symptoms of ADHD, and may differentiate children with and without ADHD.
- Cognitive control is posited to have a direct effect on motor behaviour.
- Approximately 30–50% of children with ADHD demonstrate motor control problems, possibly indicating cognitive control deficits.

RESEARCH QUESTION: Do errors made during a motor tracking task requiring cognitive control differentiate between those with and without ADHD?

Methods



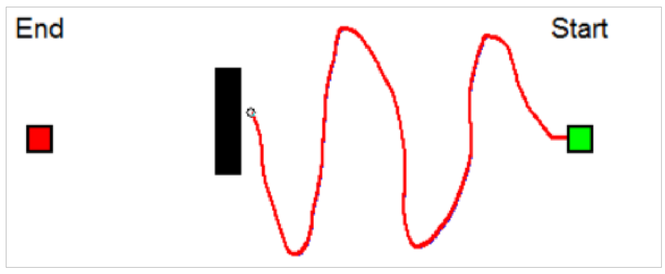


Figure 1. Motor tracking test on a tablet whereby participants used a stylus to follow the cursor (black) from start point to end point.

Two Types of Errors:

1. **Cognitive control errors** (touching the tablet too soon or moving the stylus past the cursor)
2. **Invalid trial errors** (prematurely terminating a trial, timing out on a trial, or tracking an incorrect pattern)

Results

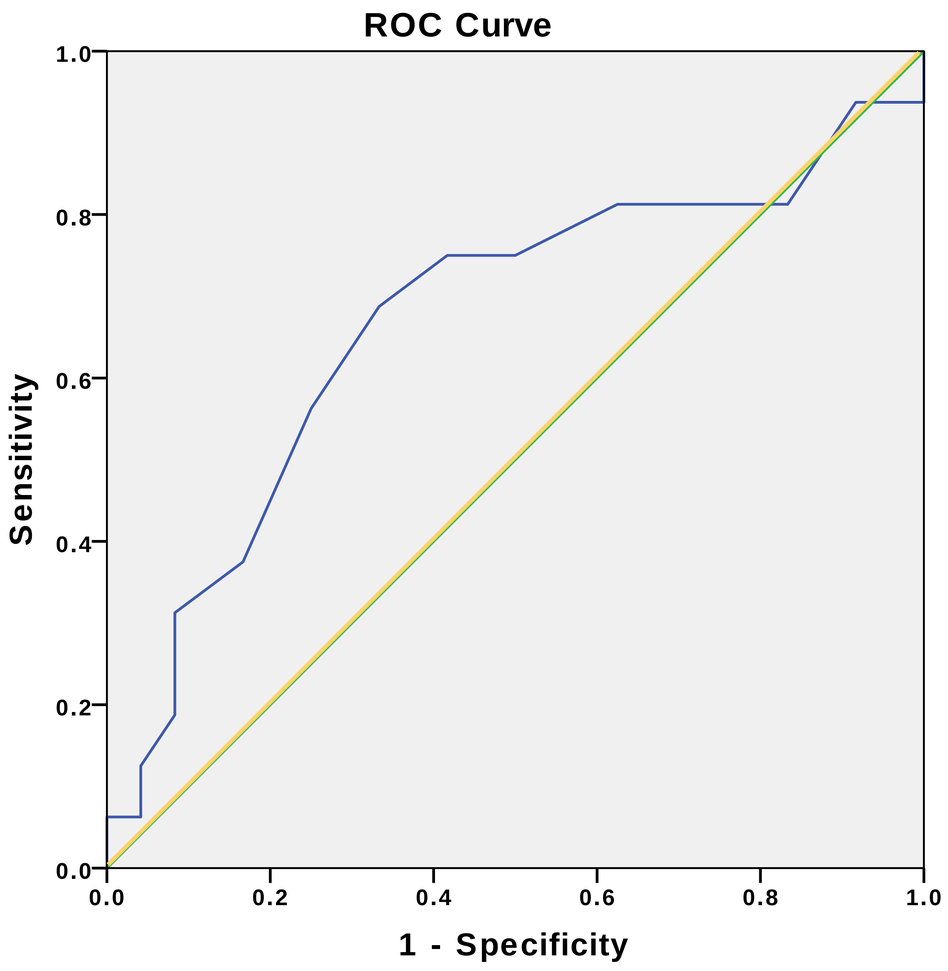


Figure 2. ROC curve analysis using total errors on a tracking task to discriminate between children with and without ADHD.

- Total errors on the motor tracking task identified with fair accuracy children with ADHD (AUC = 0.67, p = .07, SE = 0.09, 95% CI [0.49, 0.85]).
- The optimal cut-off score to maximize sensitivity and specificity was 10.5 (J = 0.36).

Errors	Sensitivity	Specificity	Errors	Sensitivity	Specificity
0.0	1	0	**10.5**	**.688**	**.667**
2.0	.938	0	11.5	.625	.708
3.5	.938	.083	12.5	.583	.750
4.5	.813	.167	13.5	.375	.833
5.5	.813	.292	15.0	.313	.917
6.5	.813	.333	16.5	.188	.917
7.5	.813	.375	18	.125	.958
8.5	.750	.500	23	.063	.958
9.5	.750	.583	36	.063	1

Discussion & Conclusions

- Total number of errors on a motor tracking task requiring cognitive control classified children with and without ADHD fairly accurately.
- Although the optimal cut-off score for diagnostic classification of ADHD was 10.5 errors, this score maintains a false positive rate of 33% and false negative rate of 31%.
- The findings support previous research suggesting cognitive control is impaired in children with ADHD.
- This task has potential as a screener for ADHD.
- This study is limited by a small sample size, thus additional research with a larger sample is needed.

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