

## Introduction

**Significance:** Children with autism spectrum disorder (ASD) of all ages have been shown to display considerable motor deficits in both fine and gross motor competence (Liu, 2013; Liu & Breslin, 2013; Provost, Heimeri, & Lopez, 2007; Schurink et al., 2012; Whyatt & Craig, 2012). Researchers also suggest that children with ASD's motor skill deficits may impact their cognitive and executive function skills such as planning ability and problem solving (Schurink et al., 2012). Poor motor function can potentially result in children with ASD spending school learning time focusing on small tasks such as holding a pencil versus listening to the teacher and in turn, affecting their executive and cognitive skills. Understanding the relationship between motor competence and executive function in children with ASD is important in order to find effective ways to improve their skills and school performance

**Research Goals:** Investigate the relationship between executive function and motor competence of children with ASD to design interventions to help improve executive function would in turn have positive effects on socialization and physical activity.

## Hypothesis

It was hypothesized that children with ASD would show delays in both motor competence and executive function and children's executive function would be positively related to their motor competence.

## Methods

**Participants:** Fifteen male children with ASD participated in this study with age ranged from 8 to 14 years ( $M = 10.87 \pm 1.73$ ). Children with ASD were diagnosed by a psychiatrist according to the criteria for diagnosis presented in DSM5.



## Instrumentation:

- Movement Assessment Battery for Children-2 (MABC-2)
- Conners Continuous Performance Test-3 (CPT-3)

**Procedures:** Children's performance was assessed at a local elementary school. All assessments were performed by the primary investigator and trained research assistants in enclosed quiet classrooms in order to minimize distractions. During MABC-2 assessment, chronological age was used to determine the proper assessments according to the corresponding age band. Each child received verbal instructions and demonstrations prior to each motor skill task. For CPT-3 testing, each child was assessed in a quiet enclosed room with one research assistant to minimize distraction and excess noise. Children were given verbal instructions from the CPT-3 manual and visual demonstration as instructions were read. Children were instructed to press a spacebar for every letter they see expect the letter "X". A one-minute practice trial was given to ensure understanding of the instructions and after the child passed the practice trail, the test begins. The CPT-3 assessment takes 14 minutes to complete once the practice trail is passed and the official assessment begins

## Statistical Analysis

- Raw scores of each MABC-2 subtest and the overall scores from combination of all eight tasks were converted into percentile scores. The CPT-3 T-scores were automatically generated by computer and were exported to an excel file.
- SPSS Statistical Software(SPSS) version 24, IMB was used for data analysis.
- Significance was set at  $p < 0.05$
- Pearson correlation was used to analyze the relationship between motor competence and executive function in children with ASD.

## Results

### Motor Competence

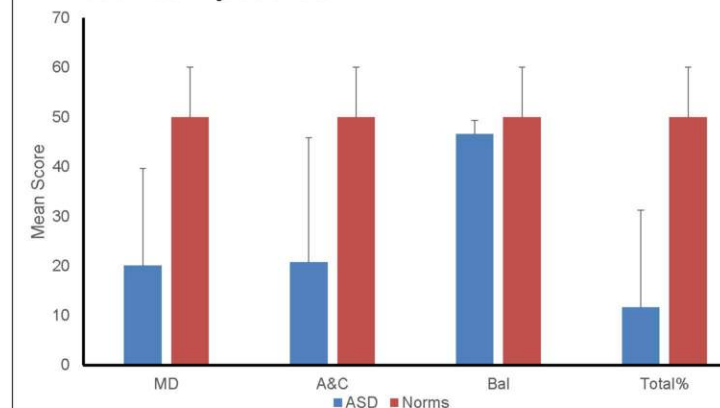


Figure 1. Mean MABC-2 subtest and total percentile scores for children with ASD and population norms Children with ASD were significantly delayed in manual dexterity, aiming and catching, and total percentile compared to norm populations.

### Executive Function

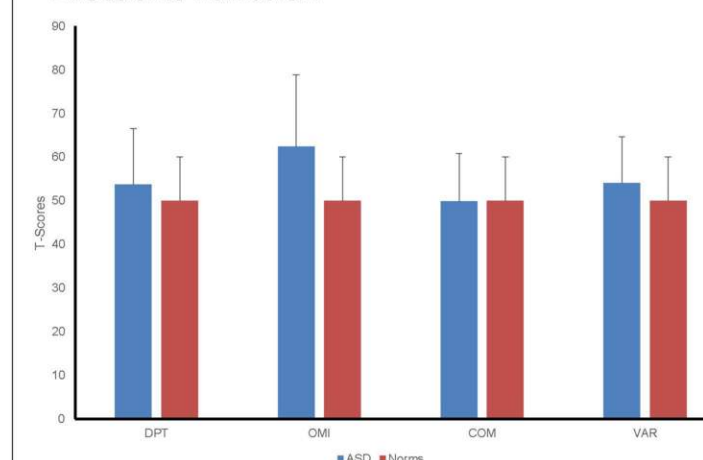


Figure 2. CPT-3 T-scores of detectability, omission, commission, and variability for children with ASD compared to norm populations. Children with ASD performed below average in detectability, omission and variability.

### Pearson Correlation

Variable	Aiming & Catching	Total Percentile
Detectability (DPR)	-.733**	-.795**
Omission (OMI)	-	-.578*
Commission (COM)	-.524*	-
Variability (VAR)	-.587*	-

Results suggested a significant correlation between executive function and motor competence in children with ASD.

## Discussion

In addition to supporting some of the previous literature on the individual topics of motor competence and executive function in children with ASD, this study adds important information regarding a relationship between the two. These findings add more comprehensive explanations and information on motor competence and executive function in children with ASD. Our findings show these two pieces are connected and this is valuable in helping fill the gaps in the literature and have implications for practitioners and educators when they design future intervention, training, and treatment programs for children with ASD.

Limitations include that this study may not be completely representative of all children with ASD. This is partly due to many lower functioning children with ASD could not complete the required motor and executive function tests or had invalid scores on executive function tests.

## Conclusion

This study showed a relationship between executive function and motor competence suggesting a deficit in one domain would lead to a deficit in the other. However, these deficits can be combated with interventions geared toward improving either domain. Limited research on this relationship exists but future research should look into future interventions to improve both executive function and motor competence in children with ASD.

## References

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