

# Executive Functioning Skills (EF) in Preschoolers with High-Functioning Autism Spectrum Disorder (HFASD) Compared to Typically Developing (TD) Peers

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## What is High-Functioning Autism Disorder (HFASD)?

- Autism Spectrum Disorder (ASD) is a DSM-5 diagnosis characterized by deficits in social communication and interaction and restricted, repetitive or stereotyped behaviors (American Psychiatric Association, 2013).
- 1 in 68 children has been diagnosed with ASD (CDC, 2014).
- Children with HFASD have a diagnosis of ASD, but also exhibit average or above cognitive and language skills.

## What is Executive Functioning (EF)?

- Set of cognitive skills essential for school achievement and the preparation and adaptation of our future workforce (Anderson, 2002; Carlson, 2005; Garon, Bryson, & Smith, 2008)
- Significant development between ages 3 and 6 in the prefrontal cortex
- EF is a predictor of academic skills, especially math in early education (Fuhs et al., 2014).
- Executive functioning skills include: inhibitory control, working memory and cognitive flexibility.

## Executive Functioning in HFASD: Previous Research

### Inhibitory Control (IC) in HFASD:

- Research has found that deficits exist for some, though not all, aspects of inhibitory control depending on the assessments used to evaluate EF in children with HFASD (Christ, Holt, White & Green, 2007; Christ, Kester, Bodner, & Miles, 2011)

### Working Memory (WM) in HFASD:

- Some research has shown that children with HFASD have deficits in EF compared to TD peers (Bennetto, Pennington & Rogers 1996; Steele, Minshew, Luna & Sweeney, 2007)
- Ozonoff and Strayer (2001) did not see any deficits in working memory in children with HFASD

### Cognitive Flexibility (CF) in HFASD:

- Research has found that cognitive flexibility tasks show the most consistent deficits for children with HFASD (Kleinmans, Akshoomoff & Delis, 2005)

## Method

### Measurements of EF:

- Inhibitory control was measured using the Day/Night Task (Gerstadt, Hong, & Diamond, 1994)
- Working memory was measured using Corsi Blocks (Berch, Krikorian, & Huha, 1998)
- Cognitive flexibility was measured using the Dimensional Change Card Sort (DCCS; Zelazo, 2006)

### Participants:

	Age	% Male	WISC	Language
HFASD (N = 12)	M = 66.67 (SD = 9.60)	83.3%	M = 103.25 (SD = 11.76)	106.33 (SD = 17.3)
TD Group (N = 57)	M = 51.16 (SD = 8.99)	45.6%	---	102.42 (SD = 18.50)

## Results

ANCOVA Predicting Group Differences in Executive Functioning Skills Controlling for Age, Gender and Language Abilities

	df	F	p	PES
IC	1(64)	.466	.497	.007
WM	1(64)	.250	.619	.004
CF	1(64)	12.777	.001**	.166

## Discussion

- This study aimed to more thoroughly consider EF deficits in a well-characterized sample of children ages 3 to 6 with HFASD compared to a typically developing control group of children.
- Results indicated cognitive flexibility deficits of young children with HFASD compared to TD peers.

### Limitations:

- The HFASD sample size was relatively small (N = 12). However, this is typical of research on clinical populations.
- Different language assessment were used for each group. However, both are norm-referenced, standardized assessments of receptive vocabulary with standard scores of 100 and a standard deviation of 15.

### Future Research:

- Additional research is needed in order to fully understand executive functioning skills in children with HFASD.
- Future research should consider how and when EF deficits develop and how EF skills change across the lifespan of individuals with ASD.
- Findings must be integrated into the development of age appropriate intervention and treatment efforts targeting EF skills for children with HFASD.