Executive Functioning Skills in Preschoolers with High-Functioning Autism Spectrum Disorder Compared to Typically Developing Peers

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

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Thesis Advisor: Dr. Mary Wagner Fuhs, Ph.D.

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 in math in early education (Fuhs et al., 2014).
- Executive functioning skills include: inhibitory control, working memory and cognitive flexibility.

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 & Dells, 2005).

Method

Participants:

<table>
<thead>
<tr>
<th>HFASD (N = 12)</th>
<th>M = 66.67 (SD = 9.60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>% Male</td>
</tr>
<tr>
<td>M = 103.25 (SD = 11.76)</td>
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</tr>
<tr>
<td>WISC</td>
<td>Language</td>
</tr>
<tr>
<td>M = 106.33 (SD = 17.3)</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>102.42 (SD = 18.50)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TD Group (N = 57)</th>
<th>M = 51.16 (SD = 8.99)</th>
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<tbody>
<tr>
<td>Age</td>
<td>% Male</td>
</tr>
<tr>
<td>M = 102.25 (SD = 11.76)</td>
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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).

Results

<table>
<thead>
<tr>
<th>ANCOVA Predicting Group Differences in Executive Functioning Skills Controlling for Age, Gender and Language Abilities</th>
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<tbody>
<tr>
<td>df</td>
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<td>-----</td>
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<tr>
<td>IC</td>
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<tr>
<td>WM</td>
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<tr>
<td>CF</td>
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</tbody>
</table>

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.

References: