Evaluating caregiver administration of executive function tablet assessment in Down syndrome

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Introduction

- Down syndrome (DS) is the most common chromosomal cause of intellectual disability, affecting approximately 1 in 707 live births per year (Mai et al., 2019).
- Executive functions (EF) are a group of cognitive abilities necessary for daily functions and goal-oriented behaviors and are recognized as an area of challenge for individuals with DS in comparison to individuals with other intellectual disabilities and those with typical development (Tungate & Conners, 2021).
- Research studies that include children with DS often rely on in-person testing of EF and there is a growing need for updated methods to remotely monitor outcomes with home assessments supervised by caregivers (Kelleher et al., 2020).

METHODS

STUDY AIMS
- This study examined caregiver and child behaviors during an executive function tablet task and compared caregiver behaviors while administering the task to the child’s performance to determine the validity of task administration.

Participants:
- Participants were 24 children with DS, ages 10 to 17 (M chronological age = 12.71, SD = 2.44; 54.2% male, 45.8% female).

Procedures:
- Participants and their caregivers completed one study visit. Caregivers watched a training video before leading the iPad task.

Measures:
- The study included a measure of executive function, the NIH Dimensional Change Card Sort (DCCS) Task. Computed scores and Age-corrected standard scores were used in analyses.
- The DCCS Task was administered by the participants’ caregivers and administration was video recorded. Parent and child behaviors were coded throughout DCCS Task completion (Table 1).

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Results

- Table 2 reports the mean, standard deviation, minimum, and maximum values for study measures.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Instructions</td>
<td>5.64</td>
<td>7.50</td>
<td>0</td>
<td>34</td>
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<tr>
<td>Caregiver Help</td>
<td>4.79</td>
<td>6.00</td>
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<td>24</td>
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<tr>
<td>Caregiver Redirection</td>
<td>2.29</td>
<td>3.68</td>
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<td>13</td>
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<tr>
<td>Positive Comments</td>
<td>3.46</td>
<td>4.81</td>
<td>0</td>
<td>16</td>
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<tr>
<td>Negative Comments</td>
<td>38</td>
<td>1.47</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Attention (% time looking)</td>
<td>88.96%</td>
<td>7.13</td>
<td>70.96%</td>
<td>95.43%</td>
</tr>
<tr>
<td>DCCS Computed Score</td>
<td>1.70</td>
<td>1.61</td>
<td>0</td>
<td>6.13</td>
</tr>
<tr>
<td>Age-corrected Standard Score</td>
<td>58.86</td>
<td>5.46</td>
<td>54</td>
<td>73</td>
</tr>
</tbody>
</table>

- Figures 1 - 3 show data visualizations for three study participants.
- Figures 6 & 7 show the relation among caregiver and child coded behaviors, controlling for child age.

Discussion

- We observed significant variability in caregiver vocalizations and instructions during the DCCS Task.
- DCCS computed scores were not related to any caregiver behaviors, suggesting instructions from caregivers during testing did not have an impact on child executive function performance.
- Caregiver redirection of child off-task behavior was positively associated with the frequency of repeating instructions and negatively associated with child attention, indicating that caregivers were attuned to child behavior and provided appropriate supports.
- Understanding caregiver behavior is essential for remote monitoring of cognitive assessments to ensure validity and accuracy of task administration.

References & Acknowledgements

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