

Evaluating caregiver administration of executive function tablet assessment in Down syndrome

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Introduction

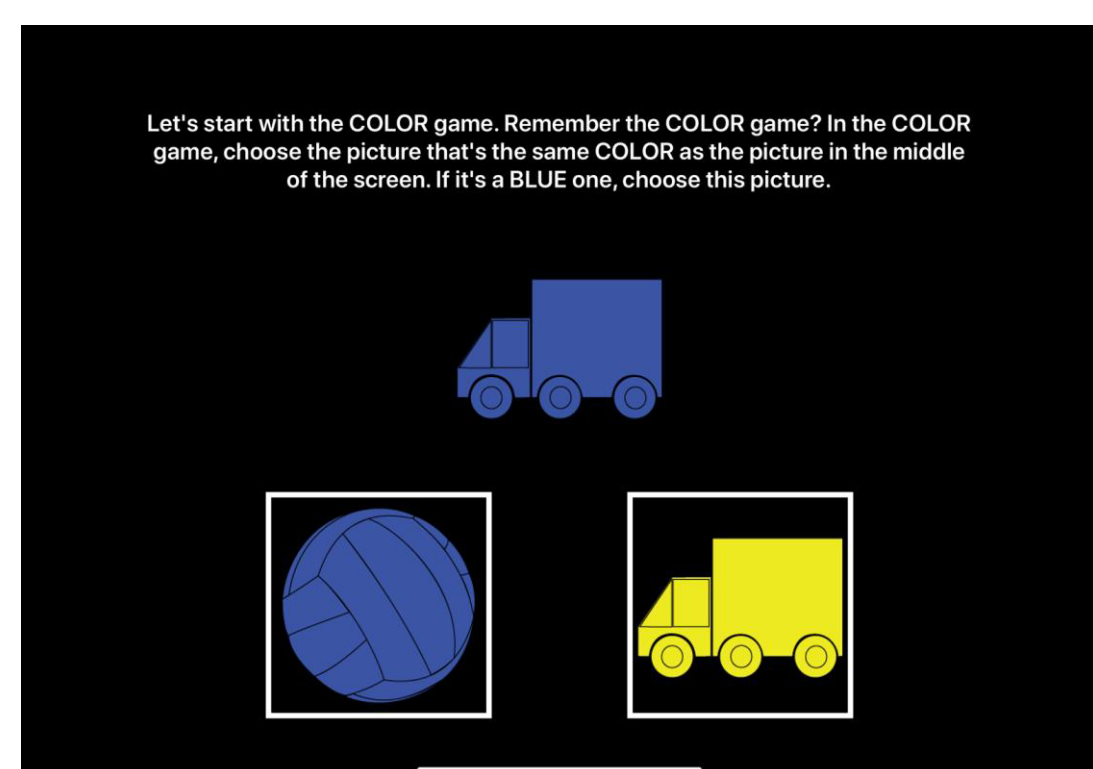
- Down syndrome (DS) is the most common chromosomal cause of intellectual disability, affecting approximately 1 in 707 live births per year (Mai et al., 2019).
- Executive functions (EF) are a group of cognitive abilities necessary for daily functions and goal-oriented behaviors and are recognized as 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).

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.

Methods

- 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).



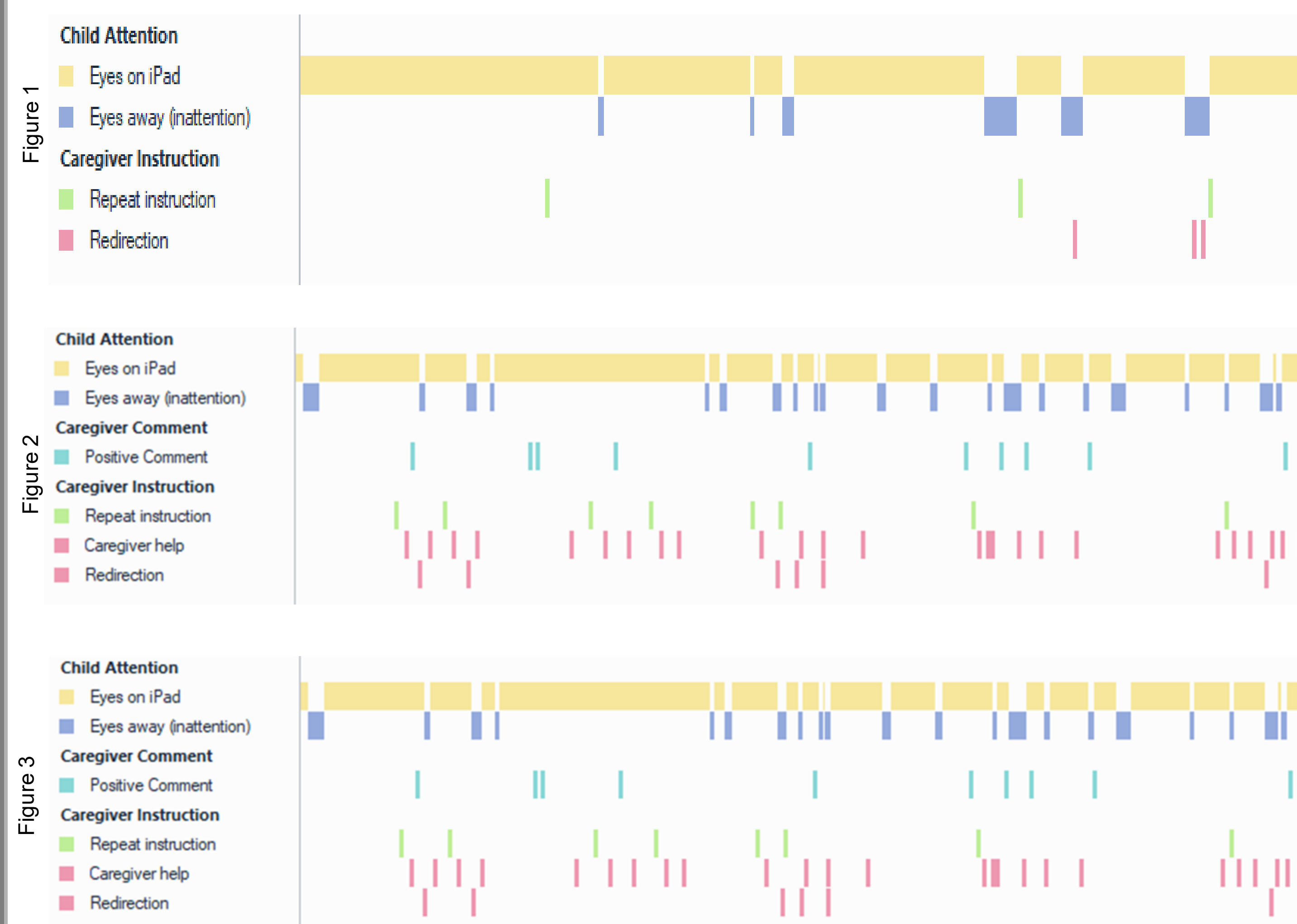
Child Attention (mutually exclusive)	
Attention	Eyes on iPad
Inattention	Eyes away from iPad (includes eyes closed)
Caregiver Vocalization	
Positive Comment	Good job, you can do this, motivational statements, offering snack/juice, remind of reward
Negative Comment	That's not how you do it, verbalizing child complete task wrong, you're not trying, you need to focus, comment on child's behavior in negative way
Caregiver Instruction	
Repeat Instructions	Saying what the instructions said again (after the initial giving of instructions)
Caregiver Help	Giving too much information (outside of what is in directions), or doing the task for the child, can include gestures and hand-over-hand
Redirection	Caregiver redirecting child back to task or providing encouragement for child to keep working

Results

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

	Mean	SD	Minimum	Maximum
Repeat Instructions	5.04	7.50	0	34
Caregiver Help	4.79	6.00	0	24
Caregiver Redirection	2.29	3.68	0	13
Positive Comments	3.46	4.81	0	16
Negative Comments	.38	1.47	0	7
Attention (% time looking)	88.98%	7.13	70.96%	99.43%
DCCS Computed Score	1.79	1.61	0	6.13
Age-corrected Standard Score	58.88	5.46	54	73

- Figures 1 - 3 show data visualizations for three study participants.



- DCCS Computed Scores were not correlated with any caregiver behaviors when controlling for child age.

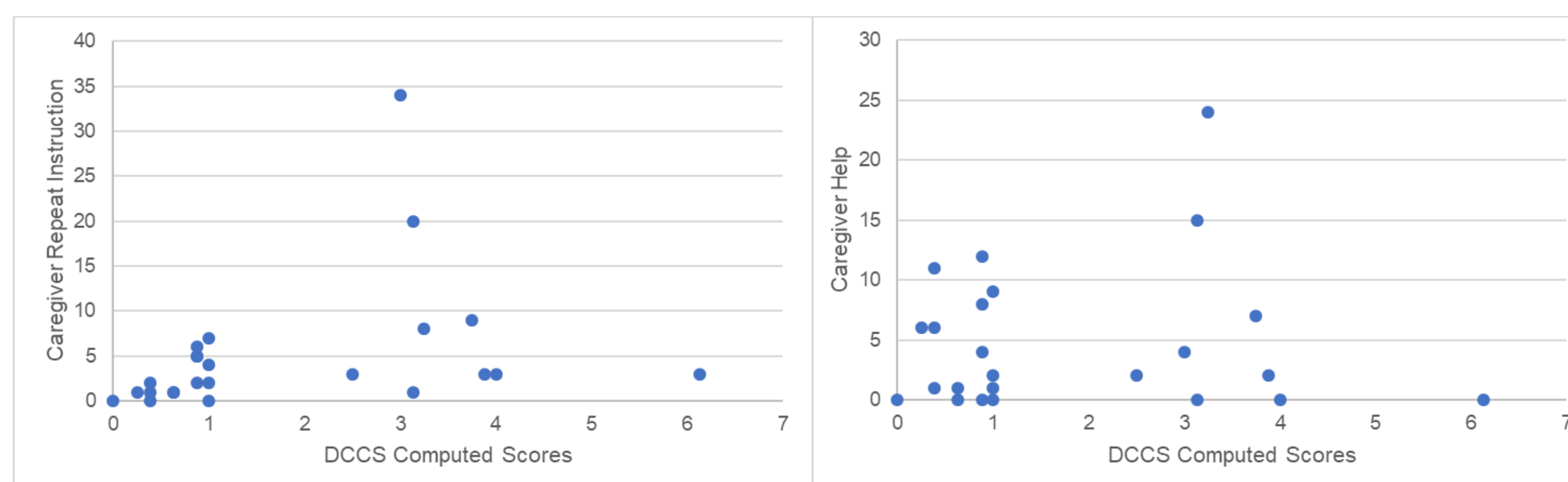


Figure 4. DCCS Computed Scores and Caregiver Repeat Instruction

Figure 5. DCCS Computed Scores and Caregiver Help

Results

- Figures 6 & 7 show the relation among caregiver and child coded behaviors, controlling for child age.

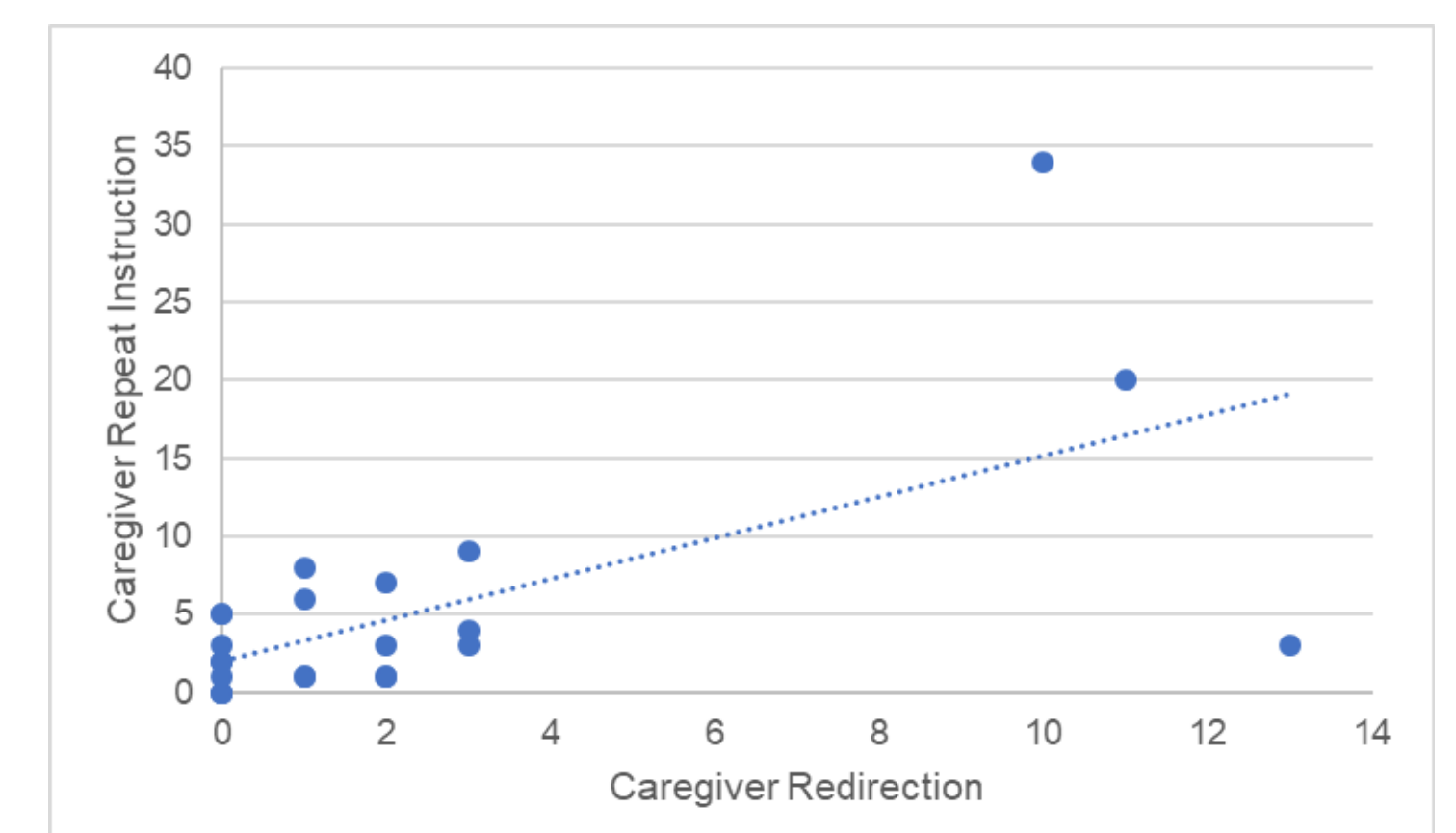


Figure 6. Caregiver redirection and repeat instruction, $r = .67$, $p < .001$

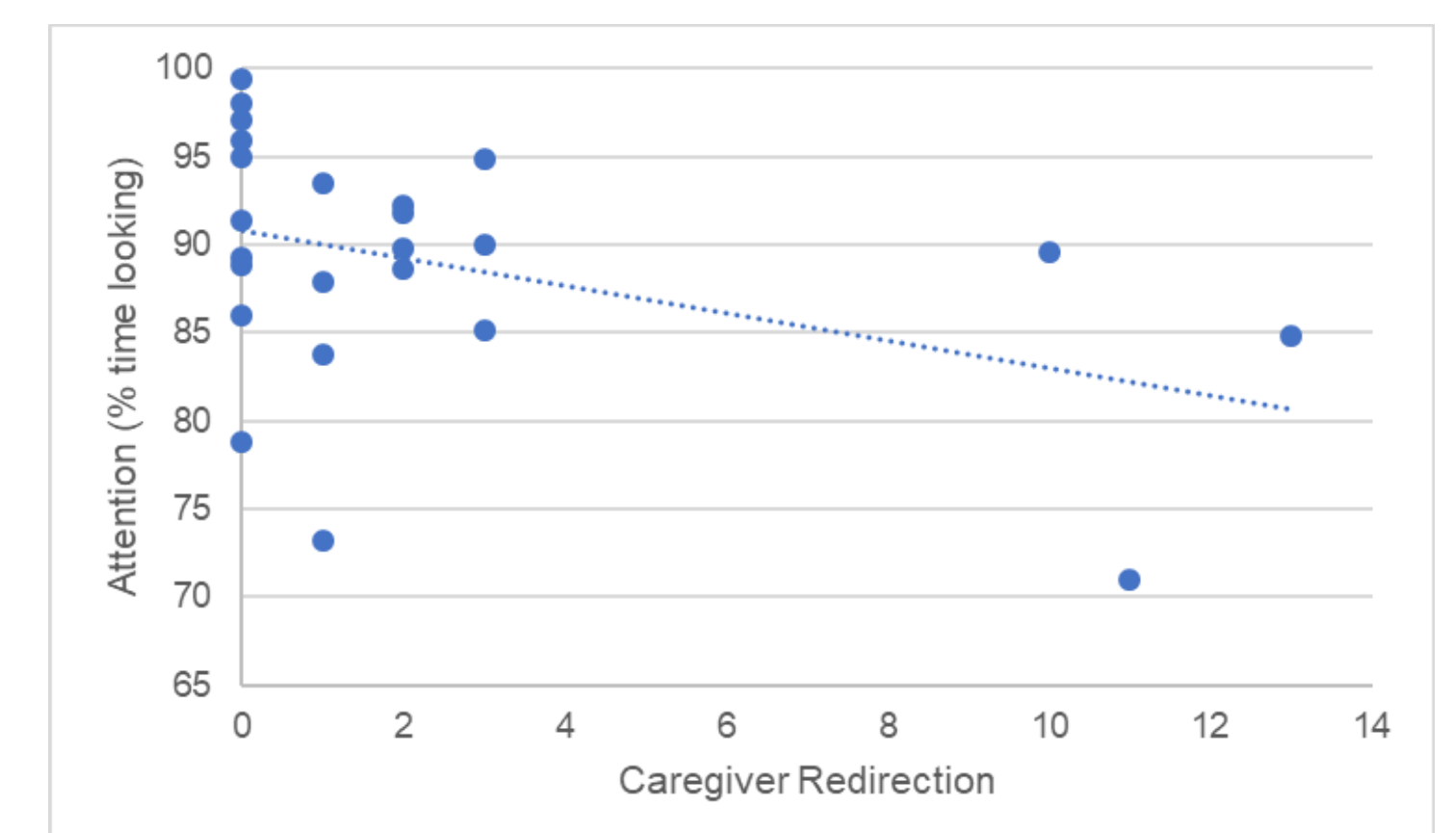


Figure 7. Caregiver redirection and child attention, $r = -.53$, $p = .009$

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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