



Expanding the Children's Kitchen Task Assessment to Three Tasks: Examining Task Reliability

Rose Brenner, OTS and Dr. Elizabeth Larson, PH.D., OTR



OCCUPATIONAL THERAPY PROGRAM, DEPARTMENT OF KINESIOLOGY, UNIVERSITY OF WISCONSIN-MADISON

Introduction

- **The Children's Kitchen Task Assessment (CKTA) Playdough Task** is a performance-based assessment that assess Executive Function (EF).¹ EF encompasses a key set of skills essential for children's adaptive & independent functioning. EF is comprised of planning, response inhibition, impulse control, working memory, and mental flexibility.²
- **Valid, reliable, & sensitive performance-based EF assessments are needed** to assess child's level of EF & to reassess after treatment to determine whether interventions were effective.
- **Novel & complex tasks are needed** to activate & test children's EF skills.³
- **Purpose:** to establish equivalency between the original Playdough task & two additional tasks (Mug Cake & Chocolate Popcorn) by establishing parallel forms reliability.

Research Design & Methods

Study Design and Participants

- A quasi-experimental, repeated measures design was used to determine whether participants performed similarly across the 3 tasks.

Participants

Participant Count by Age (in years) & Gender								
Age	Total	7	8	9	10	Gender	Male	Female
Count	6	1	2	2	1	Count	1	5

Procedures

- Each task was developed & then analyzed to assure equivalency in examining the following EF areas:

Initiation	Planning & Sequencing	Organization
Inhibition	Judgment & Safety	Termination

- Participants completed all 3 tasks in a randomized order. Scored based on amount of cuing required to complete each task successfully.

Cuing Levels		Cueing was provided as needed by child for each step, beginning with lowest level of cuing. 2 cues were given at each level before progressing to next level of cues.
Independent	0	
Verbal Guidance	1	
Gestural Guidance	2	
Direct Verbal Instruction	3	
Physical Assistance	4	
Unable to complete step	5	

Data Analysis

- Raw scores were converted into percentage scores.

$$\text{Participant Score} = 100 \times \frac{(\text{Total Cueing Points Possible} - \text{Points Cued})}{\text{Total Cueing Points Possible}}$$

- Calculated intraclass correlation coefficient (ICC) to quantify reliability within-subject between the 3 tasks using IBM SPSS 22.

Results

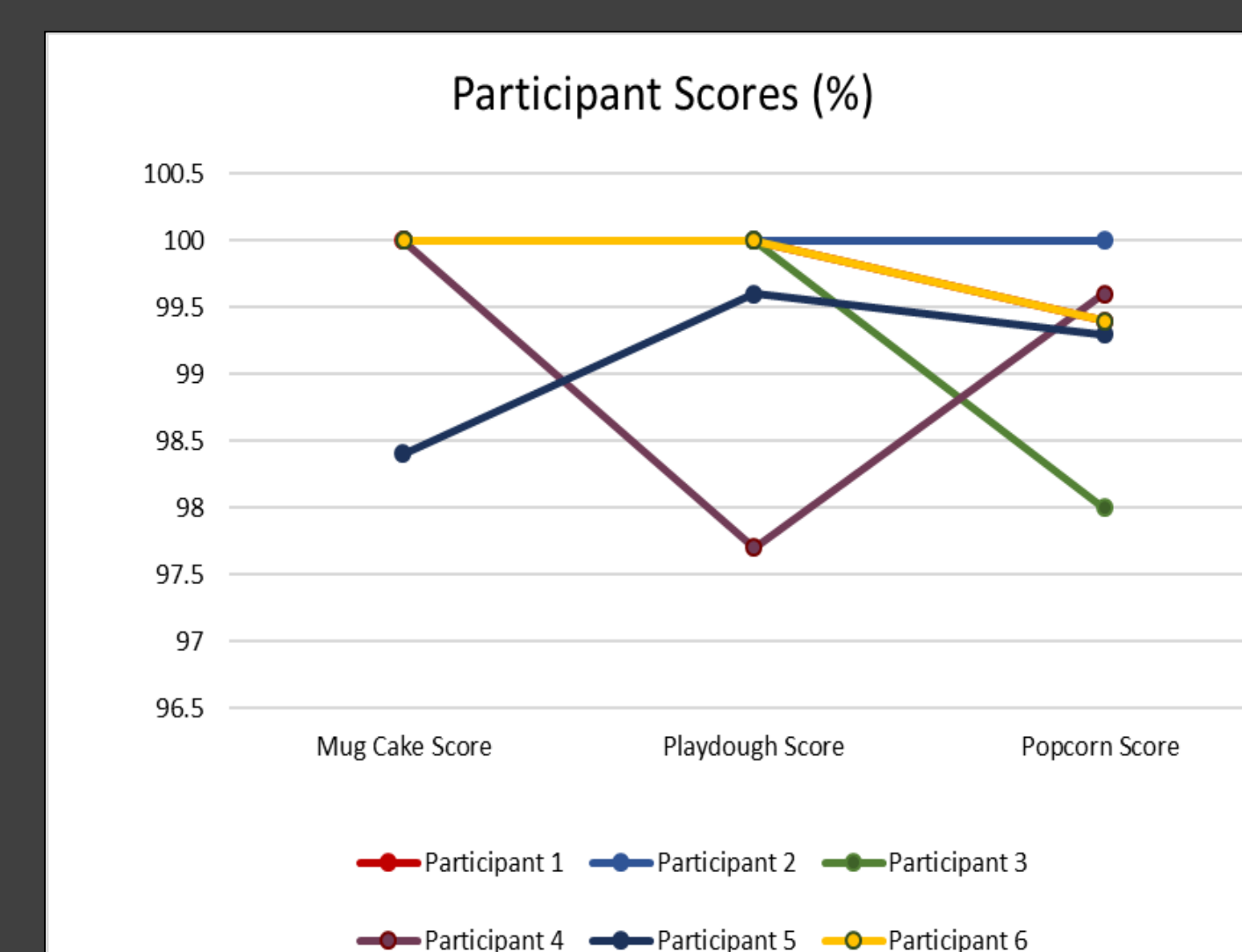
Raw Scores, Means & Standard Deviations for each Task

Higher raw scores indicate more cuing required & lower EF performance. Mean cuing scores & standard deviations were calculated for each task (mug cake, playdough or popcorn) & task order (1st, 2nd or 3rd) to examine order effects.

Participant Raw Total EF Scores by Task				
Participant	Age (years)	Mug Cake Score	Playdough Score	Popcorn Score
1	7	8	2	4
2	8	0	10	2
3	8	0	0	11
4	9	0	0	3
5	9	0	0	0
6	10	0	0	3

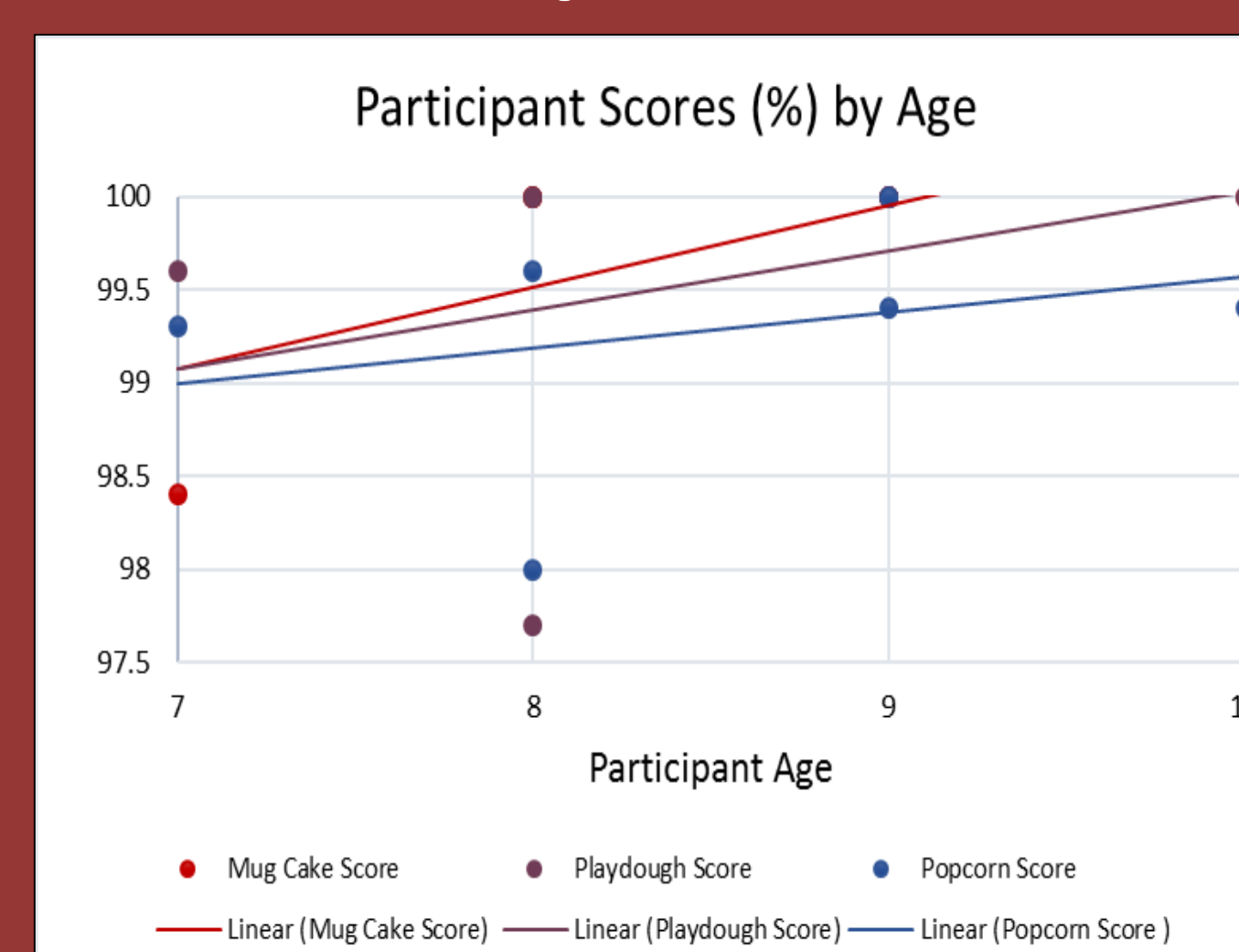
	M	SD
Mug Cake	1.33	3.27
Playdough	2.00	4.00
Popcorn	3.83	3.76
1 st Task	4.33	4.92
2 nd Task	1.83	3.25
3 rd Task	1.00	1.67

Most children showed improved performance from 1st to 3rd task



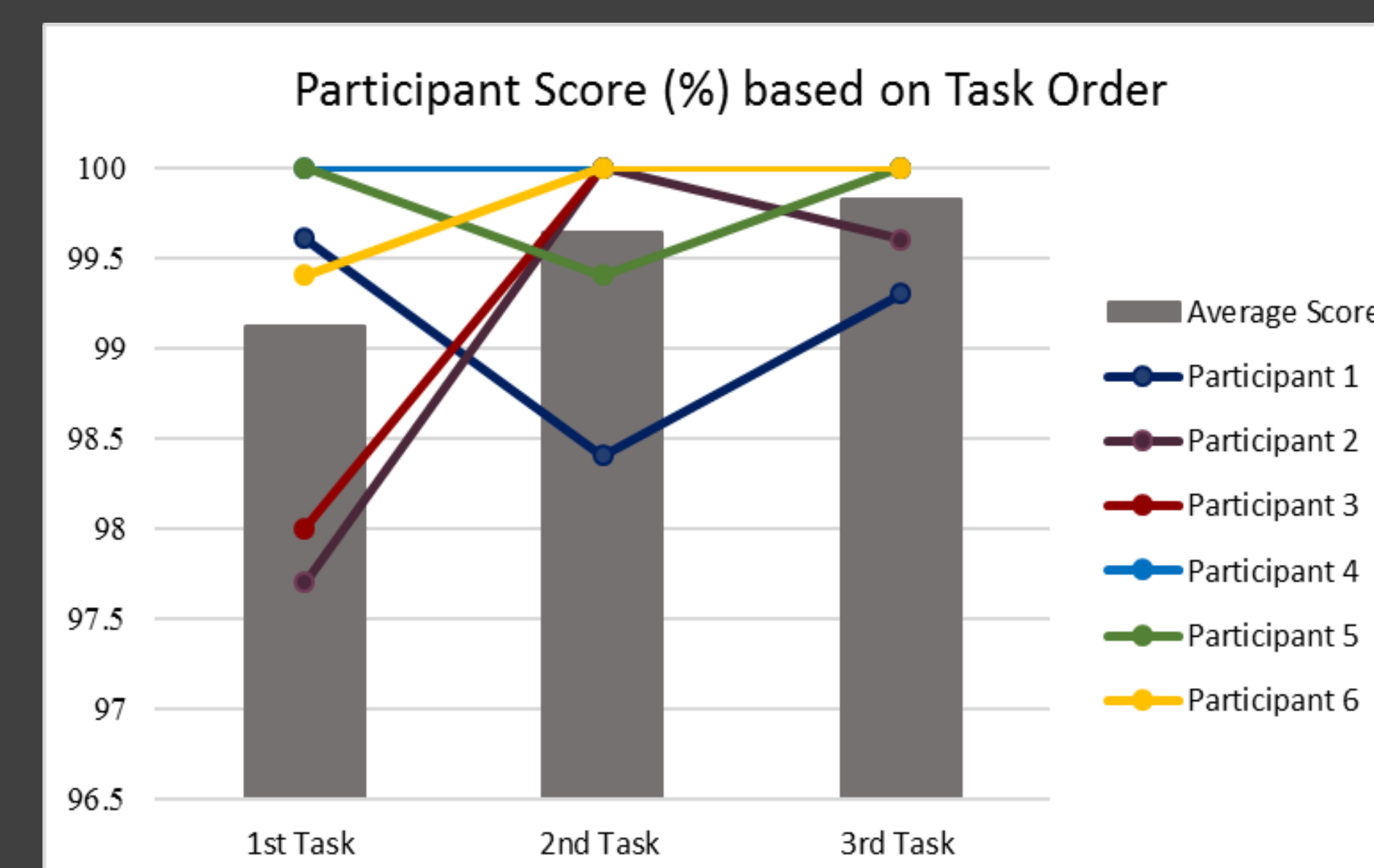
Consistently high EF Performance: All children's percentage scores were in 97.5% - 100%.

Older children had higher % scores & required less cuing



Pearson's R Correlations by Age

Task	Mug Cake	Popcorn	Playdough
R	0.36	0.30	.70
P	0.48	0.57	.12



Order Effects were Greater for Younger Children

Task Order	% Score All Ages	% Score Age 7-8	% Score Age 9-10
1 st	99.1	98.4	99.8
2 nd	99.6	99.5	99.8
3 rd	99.8	99.6	99.8

Negative intraclass correlations may reflect small sample size & greater within-groups difference than between-groups difference

ICC Calculations by Task							
All Tasks		Playdough & Mug Cake		Mug Cake & Popcorn		Play Dough & Popcorn	
ICC	p	ICC	p	ICC	p	ICC	p
-.45	.628	-0.06	0.521	-0.046	0.521	-0.78	.698

ICC of > 0.7 is strong reliability

p > .05 is statistically significant

Conclusions

Finding 1: Consistently high scores. All participants' scores were within a 2.5% range, reflecting little variability between EF performance across all tasks.

- Most cuing was needed for chocolate popcorn task, indicating it was the most difficult EF task.
- 5 out of 6 children completed mug cake with no cuing; it may be the least challenging task.

Finding 2: Age may be moderator of order effects.

- Trend noted with lowest performance in 1st task & highest percentage performance in 3rd task, suggesting learning over time when tasks completed sequentially.
- Age effects may also be a factor in this trend: greatest order effects seen in 7-8 year old group compared to 9-10 year old group.
- Further testing necessary to determine influence of age & order on differences in performance across the three tasks.

Finding 3: Negative ICC values may reflect small sample size & larger within-groups differences than between-groups differences in CKTA scores.

Implications for Practice

Each of the 3 CKTA tasks allows practitioners to learn about a child's strengths & weaknesses in EF areas through observation of child's performance of a functional task (following a recipe).

Future research should assess more children with diverse abilities to increase study power & better analyze the relatedness between the 3 tasks. To better develop tasks for the CKTA, children with disabilities that frequently have EF impairments should be included.

References

- ¹ Berg, C., Edwards, D. F., & King, A. (2012). Executive function performance on the children's kitchen task assessment with children with sickle cell disease and matched controls. *Child Neuropsychology: A Journal on Normal and Abnormal Development in Childhood and Adolescence*, 18(5), 432-448. doi:10.1080/09297049.2011.613813
- ² Hilton, C. L., Cumpata, K., Klohr, C., Gaetke, S., Artner, A., Johnson, H., & Dobbs, S. (2014). Effects of exergaming on executive function and motor skills in children with autism spectrum disorder: A pilot study. *American Journal of Occupational Therapy*, 68(1), 57-65. <https://doi.org/10.5014/ajot.2014.008664>
- ³ Anderson, P. (2002). Assessment and development of executive function (EF) during childhood. *Child Neuropsychology*, 8(2), 71.
- ⁴ Baum, C. M., Connor, L. T., Morrison, T., Hahn, M., Dromerick, A. W., & Edwards, D. F. (2008). Reliability, validity, and clinical utility of the Executive Function Performance Test: A measure of executive function in a sample of people with stroke. *American Journal of Occupational Therapy*, 62(4), 446-455. <https://doi.org/10.5014/ajot.62.4.446>

Acknowledgments

I am grateful for the guidance in this project of the principal investigator in this study, Dr. Elizabeth Larson & Dr. Brittany Travers. I also thank Sophie Riffken, Rebecca Johnson, & Mollie Gehring for their contributions. Finally, I thank Brittany Ewert, Andrea Cook, Ted Elias, & Kate Mroczynski for their previous work on the project.