

PAIRING ECOLOGICAL MOMENTARY ASSESSMENTS WITH MOBILE COGNITIVE TESTS TO STUDY CANCER-RELATED COGNITIVE IMPAIRMENTS

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Introduction:

Ecological momentary assessments paired with mobile cognitive tests ("EMCTs") offers a novel approach to studying cancer-related cognitive impairments (CRCI) that captures individual's cognitive variability better than single lab-based assessments. It is unknown which EMCTs may be most informative in CRCI research and practice. The objective of this study is to determine which EMCT measures correlate with commonly used lab-based CRCI measures and examine within-person relationships between subjective and objective cognitive EMCTs.

Methods:

We prospectively enrolled 30 breast cancer survivors within 5 years of completing treatment. Baseline clinical assessments included subjective (FACT-Cog) and objective (standardized test battery) cognitive function. Then EMCT smartphone protocols were administered once every other day for 8 weeks. Each EMCT included a 1-item rating for cognitive symptoms and 4 cognitive tests (Memory Matrix, Color Trick, Hand Swype, and Quick Tap 1). Person-specific means and root mean square of successive differences (within-person variability) were calculated for all EMCTs. Pearson's correlations were calculated for baseline clinical assessments and EMCTs. Linear mixed effects models were used to determine within-person associations between subjective and objective cognitive EMCTs.

Table 1. Pearson's Correlations Among Person-specific EMCTs and Baseline CRCI Measures (N=30)

	Baseline FACT-Cog	Baseline Cognitive Test Battery Composite
Memory Matrix mean	.36	0.58***
Memory Matrix rmssd	-.02	-.05
Color Trick reaction time mean	-.44*	-0.47**
Color Trick reaction time rmssd	-.34	-0.40*
Hand Swype reaction time mean	-.22	-.37*
Hand Swype reaction time rmssd	-.27	-.17
Quick Tap 1 reaction time mean	-.53**	-.45*
Quick Tap 1 reaction time rmssd	-.39*	-.35
N-back score mean	.00	.61***
N-back score rmssd	.21	.13
Cognitive symptoms mean	-.77***	-.15
Cognitive symptoms rmssd	-.53**	-.12

* $p < 0.05$ | ** $p < 0.01$ | *** $p < 0.001$ |

Abbreviation: rmssd: root mean square of successive differences

Findings:

Table 2. Linear Mixed Effects Models of Person-Specific Objective Cognitive EMCT

Outcome	Predictor	Estimate	Std. Err.	p.value
Color Trick Reaction Time	(Intercept)	994.702	1533.571	0.522
	Same-day cognitive symptoms (person-mean centered)	232.487	73.727	*0.002
	Previous-day cognitive symptoms (person-mean centered)	56.623	79.268	0.476
	Average cognitive symptoms	175.9	93.129	0.071
	Study day	-30.68	8.434	0
	Age (yrs)	34.202	16.527	0.05
Quick Tap 1 Reaction Time	(Intercept)	329.164	173.691	0.069
	Same-day cognitive symptoms (person-mean centered)	10.672	3.949	*0.007
	Previous-day cognitive symptoms (person-mean centered)	-1.202	4.211	0.776
	Average cognitive symptoms	12.281	10.755	0.264
	Study day	-0.996	0.407	0.015
	Age (yrs)	4.15	1.903	0.039
	Education (yrs)	-7.793	7.257	0.293

* $p < .016$ (Bonferroni corrected)

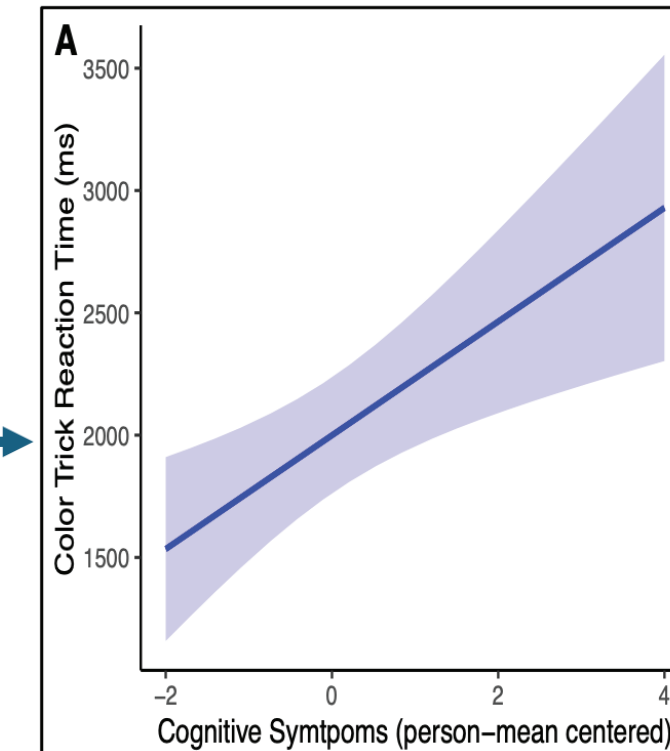


Figure 1. Within-person relationship between cognitive symptoms and executive function

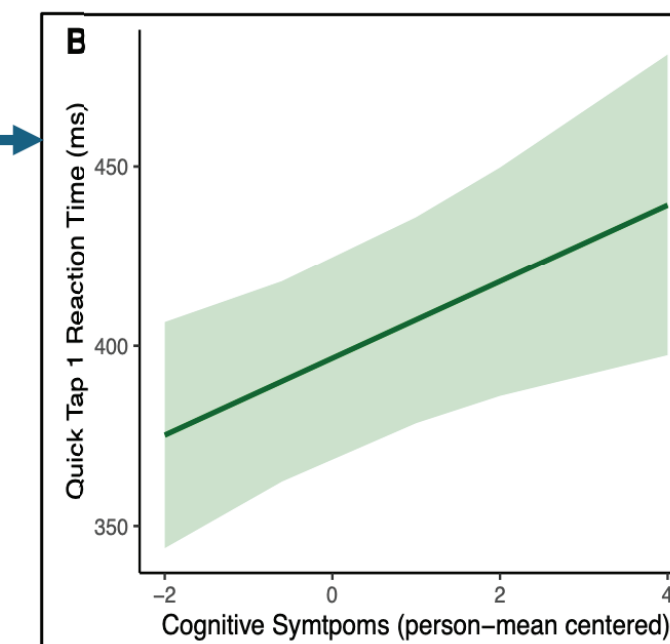


Figure 2. Within-person relationship between cognitive

Conclusions:

We found that reaction time across different EMCTs may be sensitive to both subjective and objective measures of CRCI, and that with-person subjective and objective cognitive functioning were significantly correlated across time. These findings can be used to inform EMCT selection for future observational CRCI studies.



Acknowledgement and Funding Statement:

We acknowledge all the survivors and thrivers who graciously volunteered to participate in this study. This research was supported by the National Institute for Nursing Research of the National Institutes of Health under award number R21NR020497.