Comparing Functional Abilities Between Older Adults with Mild Cognitive Impairment and Healthy Older Adults

Nhu Huynh; Abigail Holder; Reanne Cunningham, MA; & Maureen Schmitter-Edgecombe, PhD Washington State University, Department of Psychology

INTRODUCTION

• The world's population is aging, and so too is the number of older adults with mild cognitive impairment (MCI).

RESULTS

As seen in Table 4, the MCI group performed poorer on NOT Task Accuracy, t(25)=2.49, p=.036, Sequencing, *t*(25)=-2.88, *p*=.008, and Total Errors, *t*(25)= 2.12, p=.044, scores.

Table 4. NOT Variables T-Test Summary										
	MCI		HOA		T-Score	Effect Size				
	μ	SD	μ	SD						

- Cognitive changes associated with MCI can greatly impact an individual's everyday functional ability.
- Traditional cognitive assessment tools currently do a poor job of predicting everyday functional abilities.
- The Night-Out Task (NOT) is a naturalistic functional assessment administered in a laboratory setting that was developed to map on to everyday functioning and to provide insight into compensatory strategies used to offset cognitive decline.
- Compensatory strategies are measured using process approach variables to indicate behaviors such as checking, self correcting, planning, and multi-tasking.
- We hypothesized that participants with MCI would perform more poorly on the NOT than healthy older adults (HOAs) even with the use of compensatory behaviors.

METHODS

Participants

- 9 participants with MCI and 18 HOAs; age, education, and gender matched at a 1:2 ratio (see Table 1).
- All participants were age 50+ and individuals with MCI had to self-report memory complaints and score at least 1.5 SDs below the norm in at least 1 cognitive domain.

- The two groups did not differ significantly in total time or self-corrections.
- Process approach variables revealed that the MCI group spent significantly greater time pre-planning, t(25)=2.26, p=.032, and engaging in more online or mid-task planning, t(25)=2.09, p=.046, whereas HOAs demonstrated more multi-tasking, t(25)=-2.41, p=.023, and self-monitoring (i.e. double-checking), *t*(25)=-3.02, p=.006, behaviors.

Figure 1. Example NOT Testing Room



Figure 2. Cupboard A



Figure 3. Cupboard B



Main Variables

Total Time	740.56	309.72	627.72	256.86	1.01	0.40
Total Errors	6.33	5.61	3.28	1.87	2.12*	0.73
Task Accuracy	14.56	4.95	10.39	1.24	3.42*	1.16
Sequencing	4.00	1.32	5.22	0.88	-2.88**	1.09
Process Approach V	Variables					
Pre-planning	29.67	17.90	14.33	15.93	2.26*	0.91
Mid-task Planning	131.00	89.22	63.05	74.35	2.10*	0.83
Multi-tasking	16.11	2.67	19.78	4.12	-2.41*	1.06
Self-corrections	0.78	.67	0.83	0.99	-0.15	0.06
Double-checking	0.33	0.71	1.39	1.10	-3.02*	1.14

MCI=Mild cognitive impairment group; HOA=Healthy older adults *p value less than .05; **p value less than .01

CONCLUSIONS

- Our results support our hypothesis that the MCI group would perform more poorly on the NOT.
- Individuals with MCI were less accurate and efficient in

Table 1. Participant Demographic Data										
	Age (µ)	Education (µ years)	Gender (% female)							
MCI	61.44	17.00	66.70							
HOA	61.89	16.94	66.70							

Procedure

- Participants were administered multiple cognitive tests and completed the NOT, an assessment that requires participants to complete eight subtasks in preparation for a "night out" (see Table 2).
- The NOT has four main variables: total time spent on the NOT, total errors, task accuracy score (see Table 3), and the sequencing score; and five process approach variables (see Table 4).

	Table 3. Subtask Comple
Table 2. Eight NOT Sub	asks $1 = no errors$ $2 = \geq 1$ inefficient error
Plan movie trip Get correct movie cha Prepare tea (takes 3 n Choose a movie sna	$\begin{array}{r rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
Locate recipe and gat	Table 4. Process Approact
ingredients	Self-corrections Correcting r
Pack travel bag	Double checking Checking o

Table 3. Subtask Completion Score									
1= no errors	no errors								
2= ≥ 1 inefficie	$= \geq 1$ inefficient error								
$3 \ge 1$ inaccura	≥ 1 inaccurate/incomplete error								
not attempted									
Table 4. Process Approach Variables									
Self-corrections	Correcting mistakes								
Double checking	Checking over work								

Figure 4. Organizer



Figure 5. NOT Tablet Coding Application

Recipe	START	COMMENTS	INGREDIENTS			DOUBLE-CHECKING	SELF-CORRECTIO	N N	TRA	QUESTION	Trave	el Bag	START	COMMENTS	
GA	ATHERS IT	EMS BEFORE READ	ING RECIPE	Movie	START	COMMENTS	Snack STAR	тс	OMMEN	ITS	U	OOKS IN N	NULTIPLE L	OCATIONS	
RET	RIEVAL INE	EFFICIENT (>2 TRIP	S EACH CUP.)	LOOK IN MULTIPLE LOCATIONS			LOOKS IN MULTIPLE LOCATIONS			CARRIES ITEMS TO DOOR BY HAND					
DOES NOT EFFICIENTLY LOCATE RECIPE (INDEX/TOC)		RECORDS LEAVING BEFORE 6:25		TAKES MORE THAN ONE SNACK			USES ALTERNATIVE CARRIER, NOT BAG								
GATHERS CREAMY PB, NOT CHUNKY		RECORDS >\$7 SENIOR, >\$11 ADULT			CHOOSES CANDY, NOT MILK CHOC.				DOES NOT PUT ITEMS IN BAG (EXCEPTION: TEA, \$, PHONE BY HAND)						
	GATHERS	TABLE SALT, NOT	KOSHER	RETURNS TO SCHEDULE AFTER		CHANGES SNACK AFTER FINISHING TASK			DOES NOT FINISH TASK				OTHER ERROR		
	GATHER	S COFFEE, NOT ESP	PRESSO	RECORDS COST FOR ONLY ONE PERSON			CHOOSES NON-SNACK ITEM			Tea	START	COMME	ITS		
	GA	THERS EXTRA ITEM	NS	DOES NOT RECORD ANSWERS			CHOOSES DARK CHOC.				LOOKS IN MULTIPLE LOCATIONS			START NOT	
DOE	S NOT GAT	HER 1-2 NONESSE	ENTIAL ITEMS	RECORDS <\$7 SENIOR, <\$11 ADULT		DOES NOT BRING SNACK TO DOOR			WAITS FOR TEA, NOT MULTITASKING						
CARRIES ALL ITEMS TO BAG, NOT BAG TO ITEMS		RECORDS LEAVING AFTER 6:35		DOES NOT FINISH TASK			GETS TEA, NOT DIRECTLY PUT IN THERMOS								
MAKES CHANGE AFTER FINISHING TASK		DOES NOT FINISH TASK		Change START COMMENTS			MAKES TEA MORE THAN ONCE								
GATHERS GRANULATED SUGAR, NOT POWDERED		Phone START COMMENTS		LOOKS IN MULTIPLE LOCATIONS			DOES NOT START TIMER								
D	OES NOT O	SATHER 1+ ESSENT	TIAL ITEMS	LOOKS IN MULTIPLE LOCATIONS			GATHERS \$ BEFORE CHECKING SCHEDULE			DOES NOT WAIT ≥ 3 MINUTES					
DOE	ES NOT GA	THER 3+ NONESSE	NTIAL ITEMS	CALL IS NOT LAST TASK BEFORE EXIT			GATHERS MORE \$ THAN RECORDED			NO TEA IN THERMOS					
LOCATES NO OR WRONG RECIPE AND GATHERS ITEMS		CALLS BUT DOES NOT MENTION LEAVING MAKES CALL MORE THAN ONCE		ADJUSTS \$ AFTER FINISHING TASK GATHERS LESS \$ THAN RECORDED			NO WATER IN THERMOS MAKES COFFEE								
START	MAKES	MULTIPLE TRIPS T	0 DOOR	DOES NOT CALL			DOES NOT TAKE \$ OUT OF POCKET AT END			DOES NOT TAKE TEA TO DOOR					
START N		ONE OF LAST 2 TA	SKS	GETS PHONE BI		UT DOES NOT CALL	DOES NOT BRING \$ TO DOOR				DOES	NOT FINIS	HTASK		
COMM	DOES N	IOT BRING BAG TO	DOOR		DOES NOT FINISH TASK		DOES NOT FINISH TASK								
	DOES NOT FINISH TASK					Mid-Task Planning START									

- completing the NOT despite engaging in compensatory behaviors (e.g., increased pre- and online planning and reduced multi-tasking).
- This may indicate that these compensatory behaviors are less effective for individuals with MCI.
- In comparison to the HOAs, the MCI group engaged in less self-monitoring (i.e. double-checking), a strategy that may lead to improved performance but require a heavier cognitive load.
- Future directions could include using the NOT to help understand when use of internal compensatory strategies may no longer work well in helping to compensate for cognitive changes in everyday life.

REFERENCES

- Gélinas, I., Gauthier, L., McIntyre, M., & Gauthier, S. (1999). Development of a functional measure for persons with Alzheimer's disease: the disability assessment for dementia. American Journal of *Occupational Therapy*, *53*(5), 471-481.
- Vincent, G. K., & Velkoff, V. A. (2010). The next four decades: The older population in the United States: 2010 to 2050 (No. 1138). US Department of Commerce, Economics and Statistics Administration, US Census Bureau.
- Tuokko, H., Morris, C., & Ebert, P. (2005). Mild cognitive impairment





Acknowledgments

 This work was funded in part by NIBIB Grant No. R01 EB009675, NIA Grant No. R25AG046114, and NIH Grant No. R25 AG046114.