

# Likability of Activity Prompting In Smart Environments Among Older Adults With Memory Impairment.

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## Introduction

- The number of adults that will need assistance with every day instrumental activities of daily living (IADLs) is projected to increase significantly given that the U.S. older adult population is projected to double by 2050.
- Researchers have found prompting devices to be beneficial to maintaining performance on some IADLs, yet preferences for prompt mode delivery is not yet known.
- The purpose of this study was to compare preferences for different prompting modes among older adults with and without cognitive difficulties.

## Method

### Participants

The study sample consisted of 170 community dwelling older adults, both healthy ( $n = 116$ ) and with various medical diagnoses ( $n = 54$ ).

Table 1. Participant Diagnoses

	Raw	Percentages
Amnesic Mild Cognitive Impairment (aMCI)	16	29.63%
NonAmnesic Mild Cognitive Impairment (naMCI)	4	7.41%
Parkinson's Disease (PD)	11	20.37%
Traumatic Brain Injury (TBI)	5	9.26%
Stroke	6	11.11%
Other Medical Conditions (e.g. Brain Aneurysm)	12	22.22%

## Procedure

- Participants completed a comprehensive neuropsychological test battery.
- Participants also completed IADLs in a smart apartment at Washington State University. This assessment required participants to complete 3 activities, but with an error. To rectify the error, they were given a prompt mode: indirect, direct, multimodal. Each participant experienced each of the prompt modes when completing different tasks.

### Prompt Modes

- Indirect:** A verbal prompt that put the participant back on task, but did not tell them what their mistake was.
  - “The oatmeal may burn if the stove is left on.”
- Direct:** A verbal prompt that told the participants exactly what to do.
  - “You can turn the stove off now.”
- Multimodal:** A verbal direct prompt and visually showed a video of what needed to be done.
  - A video of a person appears on a screen turning the knob on the stove to the off position, along with a direct verbal prompt.
- The phone or tablet beeped to get participants attention to the video before multimodal prompt delivery.
- Participants were asked which prompt they preferred.

## Results

### Promis Questionnaire

- Patient Reported Outcomes Measurement Information System (Promis) is an 8 item questionnaire to assess self-reported cognition.
- For example, “My mind has been as sharp as usual.”
- Scores were summed across questions based on a 1-5 Likert rating scale with 1 = “not at all” 5 = “Very Much.”
- Participants were split down the median and then matched on age and education.
- Lower scores ( $\leq 31$ ) indicated more cognitive complaints, while higher scores ( $\geq 32$ ) indicated less cognitive complaints.

### Chi-Square

- 81.5 % of participants with a medical diagnoses fell in the “more cognitive complaints” category.
- A chi-square revealed participants with more cognitive complaints preferred the multimodal prompt, while participants with less cognitive complaints indicated a preference for direct prompts ( $p = .032$ ).

Table 2: Prompt mode preference based on Promis score

	Indirect	Direct	Multimodal
Less cognitive complaints	15.3%	36.5%	<b>48.2%</b>
More cognitive complaints	25.9%	<b>44.7%</b>	29.4%

$p = .032$

### Cognitive Measures

- Executive Function (EF):** a broad term that encompasses a multitude of higher order cognitive processes, such as: cognitive flexibility, task shifting, and inhibition.
  - Verbal Fluency Switching:** Participants are told to switch back and forth from naming a fruit then a piece of furniture.
  - Design Fluency Switching:** Participants are given a sheet with boxes of dots on it. Within each box, they are told to connect dots only using 4 lines, alternating between filled dots and unfilled dots.
- Memory:** processes that are used to acquire, store, retain, and later retrieve information.
  - MAS Prose Immediate Recall:** Participants are told a short story and are then asked to recall as much of the story back.
  - MAS Prose Delayed Recall:** After a delay, the participant is asked to again recall as much of the story as they can remember.

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### Correlations

- Bivariate correlations revealed significant correlations between memory measures and prompt preferred ( $p < .05$ ), but there were no significant bivariate correlations between executive function measures and prompt preferred ( $p > .05$ ).

Table 3. Correlations with preferred prompt

	R	p
Verbal Fluency	.022	.773
Design Fluency	-.084	.283
MAS Prose Immediate Recall	-.187*	.016
MAS Prose Delayed Recall	-.210*	.006

\* $p < .05$

### Hierarchical Regressions

- A blocked regression revealed, as a set, the memory measures significantly predicted preferred prompt, over and above the executive functioning measures.

Table 4. Executive Functioning and Memory predicting prompt mode preference

	$\beta$	t	p	R <sup>2</sup>	F	$\Delta R^2$
Model 1			.485	.009	.727	
Verbal Fluency	.012	.540	.590			
Design Fluency	-.033	-1.21	.230			
Model 2			.017*	.073	3.10	.064
Verbal Fluency	.042	1.80	.075			
Design Fluency	.037	-1.41	.161			
MAS Prose Immediate Recall	-.019	-.588	.588			
MAS Prose Delayed Recall	-.061	-1.94	.054			

\* $p < .05$

## Discussion

- The study findings showed that persons who self-report experiencing more cognitive problems, also desired a prompt mode that provided more support.
- Difficulties with memory, in comparison to executive functioning, may be an important cognitive factor influencing the level of support a person may desire in a prompt mode.
- Overall, the indirect prompt was the least preferred prompt.
- It is imperative to examine desirable prompting technologies for older adults, in order to maintain IADLs and independence in their own home.