

Prospective Memory in a Virtual Reality Environment in Relation to Adaptive Functioning Among Older Adults

Danielle Hardesty B.S., Carmen Chek M.A., Nancy Tran B.A., Diamond Lee B.S., Michael Persin B.S., Emma Barr B.A., Jenna Moore, M.S.
& Michael Barnett, Ph.D.



Department of Psychology and Counseling
The University of Texas at Tyler

Introduction

Virtual reality (VR) has been progressively popularized to construct ecologically valid tasks for use in neuropsychological assessments (Knight & Titov, 2009). The increase of VR usage in memory assessments may be due to its ability to measure complex cognitive performances in real time. The use of VR in regard to prospective memory (PM) tests adaptive functioning through simulating everyday tasks. PM is an essential part of autonomy and independence, which is increasingly important in older adults.

Objective: The purpose of this study was to investigate the relationship between performance on PM tasks and adaptive functioning.

Hypothesis

This study hypothesized that participants who have a higher score on the analog and virtual reality time-based prospective memory tasks will have higher success in adaptive functioning.

Method

Participants

Older adults ($N = 60$), age: 49-90 ($M = 73.30$, $SD = 5.73$); Gender: 41.67% Female, 58.33% Male

Measures

Texas Functional Living Scale (TFLS; Cullum et al., 2009) is a 24-item performance-based measure of instrumental activities of daily living (IADLs) involving time, money and calculation, communication, and memory.

Prospective Memory included two time-based tasks and event-based cue measures:

Analog Prospective Memory is a pencil-and-paper prospective memory tasks

Virtual Kitchen Protocol (VKP) measures prospective memory using a learning and recall of meal preparation tasks in a virtual reality kitchen

*Total prospective memory was obtained by summing the activity accuracy and time taken to complete both cue measures.

Procedure

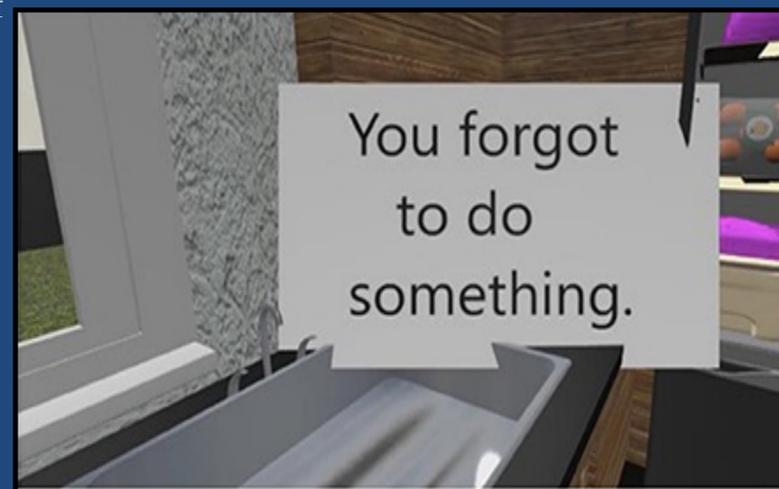
Older adults completed the TFLS as well as prospective memory tasks both time-based and event-based prospective memory cues in and out of virtual reality.

Results

Two one-way within-subjects ANOVA was conducted on adaptive functioning. There was a significant interaction effect in the difference between time-based and event-based prospective memory tasks on adaptive functioning out of virtual reality, $F(1,59) = 29.036$, $p < .001$. Similarly, a significant interaction effect was shown in the difference between time-based and event-based prospective memory tasks on adaptive functioning in a virtual kitchen, $F(1, 53) = 24.591$, $p < .001$.

Conclusion

A major limitation in the utility of virtual reality is the extent to which it mimics the experience of performing tasks in real life. However, the results were consistent with our hypothesis that older adults who score higher on time-based prospective memory tasks, in or out of a virtual reality environment, may also score higher on adaptive functioning tasks as measured by the Texas Functional Living Scale. As the population of older adults grows and is expected to reach 80 million by the year 2050 (Bekhet & Zauszniewski, 2016) assessing their adaptive functioning is an essential piece of evaluating and understanding their everyday capabilities which allows for the best care and treatment options.



POSTER

CORRESPONDENCE

Michael D. Barnett, The University of Texas at Tyler, 3900 University Boulevard HPR 235B, Tyler, TX 75799, mbarnett@uttyler.edu

Danielle R. Hardesty, Aging, Neuropsychology, and Technology Lab, The University of Texas at Tyler, dhardesty@patriots.uttyler.edu

References

- Knight, R. G., & Titov, N. (2009). Use of virtual reality tasks to assess prospective memory: Applicability and evidence. *Brain Impairment*, 10(1), 3–13..
- Kourttesis, P., Korre, D., Collina, S., Doumas, L. A., & MacPherson, S. (2020). Guidelines for the development of immersive virtual reality software for cognitive neuroscience and neuropsychology: The development of virtual reality everyday assessment lab (VR-EAL), a neuropsychological test battery in immersive virtual reality. *Frontiers*. <https://doi.org/10.3389/fcomp.2019.00012>
- Bekhet, A. K. & Zauszniewski, J. A. (2016). The Effect of a resourcefulness training intervention on relocation adjustment and adaptive functioning among older adults in retirement communities. *Mental Health Nurse*. 2016;37(3):182-9. doi: 10.3109/01612840.2015.1087606.
- Cullum, M., Saine, K., Weiner, M. (2009) Texas functional living scale. Pearson Clinical.