

The Virtual Environment Grocery Store Explains Variance in Older Adults' Adaptive Functioning Beyond Age

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INTRODUCTION

- The Virtual Environment Grocery Store (VEGS; Parsons & McMahan, 2017) is a virtual reality-based assessment utilizing a simulated shopping environment to assess tasks of executive and adaptive functioning.
- Age is an important predictor of adaptive functioning in older adults (Weber et al., 2019). However, identifying impaired adaptive functioning in older adults beyond age is crucial during neuropsychological assessment for accurate diagnosis and implementing safety plans (Bell-McGinty et al., 2002).
- While the VEGS has demonstrated relationships with older adults' adaptive functioning as measured by both self-report and a performance-based test (Hardesty et al., 2021), more research is needed to determine the relationship between adaptive functioning, age, and VEGS performance.
- **Objective:** The purpose of this study was to investigate the incremental validity of the VEGS as an indicator of adaptive functioning beyond what is accounted for by age.

HYPOTHESIS

This study hypothesized that older adults' performance on the VEGS long delay free recall would explain variance in their adaptive functioning beyond that which is accounted for by their age.

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METHOD

Participants

- Older Adults ($N = 98$)
- Age: 65-90 ($M = 75.82, SD = 6.27$)

Measures

- *The Lawton Instrumental Activities of Daily Living Scale (IADLS; Lawton & Brody, 1969)*
- Self-report scale of independent living skills
- Scores range from 0 (low functioning/dependent) to 8 (high functioning/independent)
- *Texas Functional Living Scale (TFLS; Cullum et al., 2009)*
- Performance-based measure of activities of daily living – assessing time, money and calculation, communication, and memory
- *Virtual Environment Grocery Story (VEGS; Parsons et al., 2017)*
- Virtual-based environment with shopping tasks
- Measures immediate recall, long-delay free recall, and recognition of shopping list items

Procedure

Older adults were administered the TFLS and IADLS to assess their performance-based and self-reported adaptive functioning. Shortly after, they were administered the VEGS on a computer using a keyboard and mouse.



RESULTS

A multiple regression analysis revealed that VEGS long delay free recall scores explained variance in older adults' adaptive functioning beyond age. Explained variance in TFLS scores increased from 30.8% to 48.0% with the addition of VEGS scores ($\Delta R^2 F = 1.28, p < 0.001$). VEGS scores also increased the explained variance of IADLS scores from 17.2% to 21.5% ($\Delta R^2 F = 7.03, p = .03$).

DISCUSSION

- While age explained a significant portion of the variance in older adults' adaptive functioning, this study found that VEGS scores further increased the variance explained for both self-report and performance-based adaptive functioning.
- There was a stronger relationship between VEGS performance and adaptive functioning on the performance-based task (i.e., TFLS), suggesting that the VEGS measures to older adults' objective adaptive functioning behaviors better than their perceived adaptive functioning abilities.
- This study introduces novel methods of measuring older adults' objective adaptive functioning using the virtual reality-based VEGS test.

REFERENCES

Bell-McGinty, S., Podell, K., Franzen, M., Baird, A.D. and Williams, M.J. (2002). Standard measures of executive function in predicting instrumental activities of daily living in older adults. *Int. J. Geriatr. Psychiatry*, 17: 828-834.

Cullum, C. M., Weiner, M. F., & Saine, K. C. (2009). *Texas Functional Living Scale Examiner's Manual*. San Antonio, TX: Pearson.

Hardesty, D., Chek, C., Persin, M., Barr, E., Sasser, H., Glover, T., Coldiron, A., Parsons, T.D., & Barnett, M.D. (2021). A-12 Relationships between Performance on the Virtual environment grocery store and adaptive functioning among older adults. *Archives of Clinical Neuropsychology*, 36(6), 1052.

Lawton, M.P., & Brody, E.M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9(3), 179-186.

Parsons, T., & McMahan, T. (2017). An initial validation of the Virtual Environment Grocery Store. *Journal of Neuroscience Methods*, 291, 13-19. DOI: 10.1016/j.jneumeth.2017.07.027.

Parsons, T. D., McMahan, T., Melugin, P., & Barnett, M. (2017). Virtual Environment Grocery Store. In R. Kane & T.D. Parsons (Eds.), *The Role of Technology in Clinical Neuropsychology*, (pp. 143-174). Oxford University Press.

Weber, E., Goverover, Y., Deluca, J., Feys, P., & Sastre-Garriga, J. (2019). Beyond cognitive dysfunction: Relevance of ecological validity of neuropsychological tests in multiple sclerosis. *Multiple Sclerosis*, 25(10), 1412-1419. doi: 10.1177/1352458519860318.