



# Age-Related Changes in Visual Processing Speed: A Pilot Study Using the Motor-Free Visual Perception Test- 4 (MVPT-4)

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IRB Approval #10523



## Background

- Older adults may experience gradual changes in vision, impacting their performance with functional tasks such as reading, cooking and driving. Age-related changes in visual processing speed may impact safety and independence in daily activities.
- Visual perception is the ability of individuals to recognize and interpret information about a visual stimulus and visual processing speed is the amount of time needed to make a correct interpretation (Owsley, 2013; Warren, 2013).
- A significant decrease in visual processing speed can be seen between the ages of 70 years old and 85 years old (Habekost et al., 2013).
- Older adults with a history of falls are at an increased risk of being involved in motor vehicle accidents (Scott et al., 2016).
- At the age of 70 years old, risk of motor vehicle accidents increased and continued to increase with older age (Tefft, 2008).
- The Motor-Free Visual Perception Test-Fourth Edition (MVPT-4; Academic Therapy Publications: Novato, CA) was designed to measure five components of visual perception: figure ground, visual closure, spatial relationship, visual memory, and visual discrimination (Brown, 2011a).

## Statement of Purpose

The purpose of this research study is to explore if differences in visual processing speed between younger adults and older adults can be detected using the MVPT-4.

## Research Question

**Do younger adults between the ages of 20-35 years have faster visual processing speeds than older adults ages 70 years and older when measured by the MVPT-4?**

## Methodology

**Research Design:** Cross-sectional, quantitative study.

**Participants:** English-speaking, younger adult drivers ages 20-35 years old, and older adult drivers age 70 years and older.

**Data Collection Procedure:** The Snellen Reading Chart, MVPT-3 sample questions, and MVPT-4 assessment. The response time was recorded for each test item in the MVPT-4.

**Data Analysis:** Descriptive statistics was used to analyze demographics between the two groups. One t-test compared younger adults' and older adults' total amount of time required to complete the whole assessment. Another t-test compared the older adults' and younger adults' average time for each item.

## Results

- A total of 45 participants participated in this study. The younger adult group consisted of 24 participants. Ages of this group ranged from 20-34 years with a mean age of 22.96 years ( $SD=3.42$ ). The older adult group comprised of 21 participants. This group ranged in age from 70 to 87 years with a mean age of 76.90 years ( $SD=5.47$ ).
- Results revealed a significant difference between older adults' and younger adults' time to complete the entire MVPT-4 assessment ( $p < .05$ ).

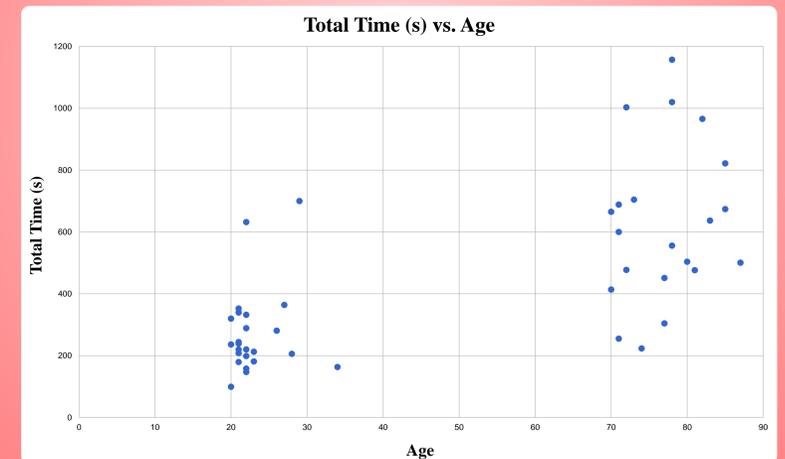


Figure 2: Comparing younger adults' and older adults' total time to complete the whole MVPT-4 assessment.

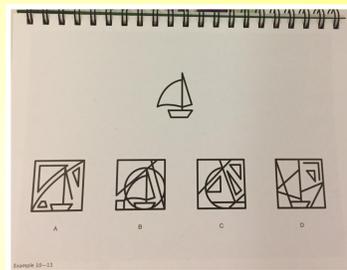
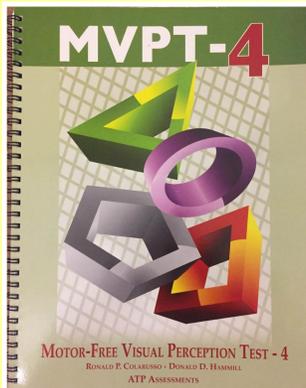
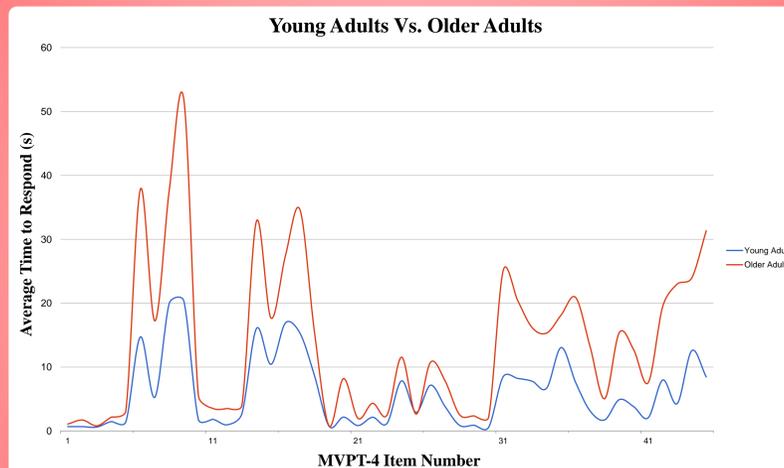


Figure 1: MVPT-4 sample assessment item.

## References

1. Brown, T. (2011a). An examination of the construct validity of the Motor-Free Visual Perceptual Test—Third Edition (MVPT-3) using Rasch analysis with adult participants. *The Occupational Therapy Journal of Research: Occupation, Participation, Health*, 31(2), 73-80. doi:10.3928/15394492-20100422-01
2. Habekost, T., Vogel, A., Rostrup, E., Bundesen, C., Kyllingsbæk, S., Garde, E., & ... Waldemar, G. (2013). Visual processing speed in old age. *Scandinavian Journal Of Psychology*, 54(2), 89-94. doi:10.1111/sjop.12008
3. Owsley, C. (2013). Visual processing speed. *Vision Research*, 90, 52-56. doi:10.1016/j.visres.2012.11.014
4. Scott, K.A., Roger, E., Betz, M.E., Hoffecker, L., Li, G., & DiGiuseppi, C. (2016). Associations between falls and driving outcomes in older adults: A systematic review and meta-analysis: A Long ROAD Study. Retrieved from AAA Foundation for Traffic Safety.
5. Tefft, B. C. (2008). Risks older drivers pose to themselves and to other road users. *Journal of Safety Research*, 39(6), 577-582. doi:10.1016/j.jsr.2008.10.002
6. Warren, M. (2013). Evaluation and Treatment of Visual Deficits Following Brain Injury. In L. W. Pedretti, H. H. Pendleton, & W. Schultz-Krohn (Eds.), *Pedretti's occupational therapy: Practice skills for physical dysfunction* (pp. 590-630). St. Louis, MO: Elsevier.

## Young Adults Vs. Older Adults



Graph 1: Comparing younger adults' and older adults' average time for each item.

## Discussion

- Results indicated that younger adults between the ages of 20-35 years old have significantly faster visual processing speeds than older adults ages 70 years and older when measured by the MVPT-4.
- Changes in visual processing speed may impact performance in driving and fall risk.
- In summary, the MVPT-4 may be able to detect age-related changes in visual processing speed and therefore, occupational therapists may be able to use the MVPT-4 as a clinical tool in pre-driving and fall risk assessment.

## Acknowledgement

Our team is very grateful for everyone who contributed to make this study possible. We would like to thank our capstone advisor, Kitsum Li OTD, OTR/L, CSRS for her guidance and support. And big thanks to all of our participants and research assistants! This study was partially funded by the California Foundation for Occupational Therapy Seed Money Grant. Thank you Academic Therapy Publications for your generous donation.