



# Visual Scanning Training for Older Drivers

## Background

In 2019, nearly one in six people in the United States were 65 or older. By 2030 all baby boomers will be over 65, which could expand the size of the older population to about one in five residents. Many older Americans depend on driving to maintain their mobility, independence, and health. In addition, older adults in much of the country have few transportation options beyond driving.

While age itself does not determine whether someone is safe to drive, age can change physical and cognitive abilities, and consequently, driving behaviors. In 2019, some 15% of drivers in fatal crashes were 65 or older (NCSA, 2020). The challenge for older driver safety is to balance older adults' mobility with their safety, and the safety of all road users.

## Visual Scanning Training

This investigation sought to further the development of an intervention to improve older driver safety that appeared promising in previous NHTSA-sponsored research. In the earlier study, *Validation of Rehabilitation Training Programs for Older Drivers* (Staplin et al., 2013), researchers reported preliminary evidence that a novel visual scanning training (VST) program, delivered in one-on-one sessions by an occupational therapist (OT) in a clinical setting, could enhance driver performance. A literature review of studies from 2005 to 2016 that focused on older drivers' visual scanning ability and on evaluations of training in visual scanning skills for older adults (Lococo & Staplin, 2018) also suggested training effectiveness.

A certified driver rehabilitation specialist (CDRS) developed this program by adapting principles from a prominent text on visual attention (Mills, 2005). The training was designed to expand the area from which a driver could detect and use visual information relevant to driving. The program also provided exercises to improve visual search routines to further expand the driver's awareness of potential hazards within the driving environment.

The current study sought to validate the preliminary findings from Staplin et al. (2013) using a modified version of the previous training protocol. The goal was to develop a VST program to be delivered one-on-one in an office setting by a generalist OT (who lacks the CDRS credential), to healthy older drivers to help them keep driving safely.

A panel composed of subject matter experts indicated that behind-the-wheel sessions that had been used to reinforce in-clinic exercises in the previous study would prevent widespread use of this training by generalist OTs. The OTs on the panel explained that they were not permitted to take clients out in vehicles like CDRSs could. They would have to hire driving schools to provide vehicles and driving instructors to carry out the on-road exercises, which would make the program too costly to administer.

This posed a dilemma for the research team. On one hand, the purpose of the study was to develop an older driver safety program that could be administered by OTs, but including an on-road element would limit their access to the program. On the other, previous research indicated that an on-road element was likely to enhance the program's effectiveness.

The research team opted to remove the on-road component to make the program accessible to OTs. The current study aimed to determine the effectiveness of this modified version of the training protocol in improving driver scanning and driving performance.

Eighty-nine active drivers ranging in age from 70 to 100 participated in the study. To evaluate training effects, researchers analyzed CDRS-administered road test scores as well as glance behavior coded from video of the drivers' faces during the evaluation. Questionnaire responses provided participants' perceptions of the value of the VST program.

Researchers hypothesized that, compared to a control group, participants who completed the training:

- would exhibit improved performance in driving tasks that required monitoring multiple stimuli (e.g., negotiating an intersection or turning left across traffic) from pre-training to immediately after training, and from pre-training to 3 months after training.
- would show a significant increase in the frequency and/or the duration of glances directed away from the forward view at the immediate and 3-month post-training assessments.

Findings did *not* support these hypotheses. While the number of participants had sufficient statistical power, analyses revealed no statistically significant differences in the

performance of treatment relative to control group drivers at either post-intervention assessment.

Limitations in the research design may account for the failure to find group differences. First, the absence of on-road training sessions, a key element of the Staplin et al. study that served as the basis for this one, may have diminished participants' ability to transfer what they learned in the training exercises to on-road driving.

Next, a driver's behavior during an on-road evaluation by a CDRS is subject to certain "demand characteristics" as participants listen to and interact with the CDRS. In addition to providing verbal instructions for route navigation, the CDRS often converses with the participant throughout the drive—an intentional part of the evaluation that can reveal divided attention deficits. This conversation may have interfered with participants' ability to apply newly learned scanning behavior during the CDRS evaluations.

Finally, participants may have been less likely to use the newly learned skills in the artificial context of a driving evaluation. A naturalistic data collection method to monitor changes in scanning activity over time, as participants drove their own vehicles while going about their normal routines, might have yielded different results.

While outcome measures did not demonstrate that the training resulted in improved driving performance, questionnaire responses indicated that participants felt strongly that what they learned through the exercises would help them drive more safely. They considered the training valuable; not only would they recommend the training to friends and relatives, several indicated that they would be willing to pay up to \$50 for the program, with or without an auto insurance discount.

This study revealed both strengths and weaknesses of the VST program. A complete curriculum was developed and delivered by a generalist OT to older drivers, who overwhelmingly felt the training program would help them drive more safely. An affordable training platform was designed, built, and documented in sufficient detail to be easily replicated.

This platform offers the flexibility to provide VST to diverse populations and may merit further evaluation in applications that are unconstrained by the limitations noted above, which do not support the training as tested.

More information on this project can be found in the full report at

Staplin, L., Lococo, K. H., Crompton, C., Mastromatto, T., Quinones, T., & Sifrit, K. J. (2022, May). *Visual scanning training for older drivers* (Report No. DOT HS 813 295). National Highway Traffic Safety Administration.

For information on programs shown effective in improving older driver safety, see Chapter 7 in

Venkatraman, V., Richard, C. M., Magee, K., & Johnson, K. (2021, July). *Countermeasures that work: A highway safety countermeasures guide for State Highway Safety Offices, 10th edition, 2020* (Report No. DOT HS 813 097). National Highway Traffic Safety Administration. <https://rosap.nhtsa.gov/view/dot/57466>

## References

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Suggested APA format citation for this document:

Staplin, L., Lococo, K. H., Crompton, C., Mastromatto, T., Quinones, T., & Sifrit, K. J. (2022, May). *Visual scanning training for older drivers* (Traffic Tech Technology Transfer Series. Report No. DOT HS 813 296). National Highway Traffic Safety Administration.



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