

U.S. Department of Transportation Visual Field Loss

This project compared drivers with visual field loss to those with normal vision on driving scenarios at the National Advanced Driving Simulator. Participants with visual field loss showed more variance in maintaining the driving lane on curves, when leaving the simulated freeway, and when responding to peripheral information.

Lead Agency:

U.S. Department of Transportation
National Highway Traffic Safety Administration (NHTSA)

Agency Mission:

Save lives, prevent injuries and reduce economic costs due to road traffic crashes through education, research, safety standards and enforcement activity.

Principal Investigators:

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General Description:

Vision is clearly essential for safe driving. Deterioration in vision through normal aging, as well as from eye diseases such as cataracts and macular degeneration has been shown to be a major contributing factor in changes in driving strategies and performance. Drivers, however, may not always compensate for their deterioration appropriately, resulting in higher crash risks.

The goal of this study was to use the National Advanced Driving Simulator (NADS) to compare driving performance in participants with peripheral visual field loss (VFL) and those with normal vision. NADS is a high fidelity simulator that simulates the visual, auditory and haptic feedback one would experience during real world driving. The driving task was designed to capture compensatory behaviors in drivers with VFL such as increased head movements, eye scanning patterns, and mirror use in addition to driving performance measures in the simulator.

The results from this study indicate that, while VFL and Control participants' performance was similar in most tasks, there were a few significant differences in driving performance measures between the groups. Participants with VFL exhibited some difficulties with lane maintenance on curves and when departing the freeway as well as a delay in responding to the vehicle incursion, an unanticipated hazard that originated in the periphery during the simulator driving task.

Excellence: What makes this project exceptional?

This project suggests a safety risk for driving for people with a reduce field of vision. The study identifies several driving conditions (curves, exit ramps) where drivers with VFL may be at increased risk.

Significance: How is this research relevant to older persons, populations and/or an aging society?

Deterioration in vision through normal aging is a major contributing factor in changes in driving strategies and performance. Drivers may not always compensate for their deterioration appropriately resulting in higher crash risks. Understanding the degree to which visual field loss impairs driving will be helpful to older drivers.

Effectiveness: What is the impact and/or application of this research to older persons?

This research provides preliminary information about how visual field loss may impact the safe driving of older people.

Innovativeness: Why is this research exciting or newsworthy?

This research uses advanced simulator technology to examine how older drivers who have certain visual impairments that reduce the useable visual field perform on simulated driving tasks. Findings from this study will be used to build a taxonomy of driving scenarios that may increase crash risk, and suggest countermeasures to compensate for visual loss.