Canadian Geriatrics Society

PROGRAMS FOR IMPROVING THE SAFETY OF OLDER DRIVERS

Michelle M. Porter, PhD,
Faculty of Kinesiology and Recreation Management, University of Manitoba, Winnipeg, Manitoba

Correspondence may be directed to michelle.porter@umanitoba.ca.

Introduction

This article provides research on programs that aim to assist older drivers and focuses on the health-promotion context or community programs. Some mention is also made regarding the evidence, where it exists, of interventions for older drivers who have particular medical conditions.

Interventions For Older adults—Health-Promotion Context

In 2009, Korner-Bitensky and colleagues[1] published a systematic review of the literature on older driver health-promotion interventions, based on research up to 2008. In this review they excluded studies where drivers had specific medical conditions (i.e., stroke and neurological conditions). They found 1) moderate evidence recommending physical training and 2) strong evidence for education plus on-road training. For both of these categories of interventions, the outcome was performance on on-road tests. However, there was moderate evidence suggesting education alone was not effective in reducing crashes. Details of the studies in each category, as well as newer publications where applicable, are provided below.

Physical Training

A randomized controlled trial (RCT) by Marottoli and colleagues[2] involved 178 older drivers (aged ≥ 70 years; average age 77 years) with physical impairments but without visual or cognitive impairments. The outcome for this intervention was change in performance on an on-road test, scored by an examiner in the vehicle, which was performed at baseline and three months later. Anyone who failed the baseline driving test or who was deemed almost perfect at baseline was excluded from the study. Physical therapists delivered weekly sessions that targeted mobility of the neck, trunk, and lower limbs, as well as hand strength and upper extremity coordination/dexterity. In addition, gait abnormalities were addressed and participants were encouraged to walk for exercise. Participants randomized to the intervention were asked to perform the exercise/coordination program daily, which was designed to take about 15 minutes.

The control group received monthly education related to vehicle care, fall prevention, and general safety. After three months, a statistically significant difference of 2.43 points was found between groups on a 72-point scale of on-road driving performance, with the intervention group maintaining their performance and the control group declining. However, while the authors acknowledge the difference might be meaningful to a driving evaluator, "the clinical relevance of such a difference is unknown." Two other studies,[3, 4] examined by Korner-Bitensky and others,[1] found that physical training showed some mixed results, many showing that the group that received physical training intervention improved on-road driving performance more than the control groups. Again, the clinical relevance of these studies is unclear, as none have examined whether physical training alone has any

impact on crash risk.

Some recent studies have been conducted to examine how exercise might impact older driver safety.[5–8] Two studies found that high-speed resistance training or power training could improve brake reaction time in a simulated setting.[7,8] In 2009, Marmeleira and others[5] reported that an exercise program that "was planned to stress perceptive, cognitive, and physical abilities" improved many abilities related to driving, such as reaction time, movement time, and visual attention. They[6] also found that an exercise program that required "participants to respond quickly to challenging situations" (combined mental and physical exercise) improved their speed responses to in-vehicle challenges.

Education Programs

Classroom-based education programs are often recommended for older drivers and several exist in local communities, in state/provincial jurisdictions, as well as across nations. There is evidence they improve knowledge and driver awareness; however, the evidence (moderate level) suggests education alone does not reduce crash rates.[1] In addition, RCTs have shown that on-road driving performance is not improved by classroom-based programs alone.[9,10]

Education Plus On-Road Training

Whereas education alone does not appear to have a positive effect on older drivers, there is strong evidence to suggest that education plus on-road training can improve on-road driving performance.[1] This evidence was based on two high-quality RCTs by Bédard and colleagues[11] and Marottoli and others.[12] In both of these trials, existing classroom-based programs were delivered, with about eight hours of education being provided. The on-road training involved two 30- to 60-minute sessions with experienced driving instructors.

A recent RCT[10] delivered a similar classroom program to the studies mentioned above,[11,12] but the "on-road" training was actually based on the older driver meeting with a driving instructor and receiving feedback and instruction based on their baseline driving test, which was video-recorded, and their speed, as captured by global positioning system (GPS) data. In this trial, classroom education alone did not lead to improved on-road performance. However, those who received individualized feedback from the instructor about their driving via the video and GPS data did significantly improve on-road performance.[10]

Other advantages that can be highlighted from this type of intervention include that a driving instructor does not need to be present in the vehicle, so the older driver has to navigate on their own, without receiving cues from an instructor. In addition, because the older person is not driving while receiving the feedback, they are potentially better able to concentrate on the instructions given. They also see concrete examples of when they are driving incorrectly, and these instances can be replayed multiple times, for as many times as is necessary for the driver to understand.

What is not known from studies of on-road training is whether it is as beneficial on its own as when combined with classroom-based education. The impact of on-road training on everyday driving patterns and, ultimately, crash rates, is also undetermined. It could be that this type of training improves confidence and thus increases driving exposure or even driving in riskier situations, which could increase the absolute number of crashes. This counterintuitive increase in crashes as a result of driver education has been seen before in skid courses,[14] as well as high school driver education programs.[15] Therefore, the combination of off-road and on-road education programs might be most successful for older drivers by 1) showing older drivers where they have weaknesses or issues on the road, 2) increasing their awareness of age-related changes in abilities related to driving, and 3) increasing their use of strategies to appropriately self-regulate.

Interventions for Older Drivers with Medical Issues

Vision

Visual impairment is an issue for many older drivers. Educational programs have been designed to assist older drivers with vision impairment. High-quality evidence suggests that, although these programs improve self-reported, self-regulatory behaviours, they do not lead to reductions in crashes.[16] For example, Owsley and colleagues[17] conducted a relatively large RCT involving 403 licensed drivers aged 60 years and over with visual impairment, based on visual acuity or a test of visual processing abilities, who had crashed their vehicle in the previous year, according to Alabama state records. Participants randomized to the intervention group received an individually tailored program to increase awareness of their specific visual problem, how it might affect driving safety, and what strategies the older driver could use to improve their safety (e.g., avoid nighttime driving and driving in inclement weather). Intervention participants self-reported changes in their driving patterns (e.g., decreased exposure), but their crash involvement was no different from the control group.

Although it is beyond the scope of this article to discuss cataract surgery, it is an intervention that has been shown to reduce self-reported driving difficulties, both during the day and at night.[18] It seems a change in contrast sensitivity is more important than a change in visual acuity in improving driving performance[19] and reducing self-reported driving difficulties.[20] The evidence available suggests that crashes are lower in those having undergone the surgery than those who had not.[21] In addition, it is apparent that those who are waiting for surgery show increased depression,[22] and quality of life may be ameliorated by having the surgery.[23]

Stroke and Cognitive Impairment

The evidence and recommendations regarding rehabilitation programs or interventions for patients who have had strokes are mixed. Classen recommends that occupational therapists provide simulator training, traffic-knowledge tests, and on-road training.[16] However, a recent Cochrane review[24] states, "There was insufficient evidence to reach conclusions about the use of rehabilitation to improve on-road driving skills after stroke." In their systematic review, they found that simulator training improved "visuocognitive abilities" (road-sign recognition), but there were no RCTs that examined on-road instruction. An issue with this research topic is that individuals who have had strokes might also have cognitive impairments, and cognitive impairments might impact the ability of an intervention to positively influence an older driver who has had a stroke.[25] Only one small non-RCT has examined a restriction intervention for cognitively impaired older drivers,[16] hence there is no evidence for interventions or programs for cognitively impaired drivers.

Conclusion

In this review some health-promotion interventions were shown to have promise for older drivers. These include on-road training combined with classroom-based education and physical training. Surprising to many, classroom-based education does not appear to be beneficial on its own. There is also little evidence available of interventions for older drivers who have had strokes or have cognitive or visual impairments (the exception being cataract surgery, which has many possible benefits). In general, high-quality research on interventions for older drivers and particularly for older drivers with specific medical conditions (e.g. dementia) is relatively sparse, thus more research is needed.

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Key Points

- *Classroom-based education programs alone do not appear to reduce crashes or improve on-road driving performance in older drivers.*
- *On-road training combined with classroom-based education improves on-road performance.*
- *Physical training seems to confer benefits on older drivers' on-road performance.*
- *Education programs for visually impaired older drivers do not affect crash rates, but cataract surgery seems to confer benefits in terms of reduced crashes and improved quality of life.*
- *The evidence for programs/interventions for patients who have had strokes is limited.*

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