‘SENIORS DRIVING LONGER, SMARTER, SAFER’: AN OLDER DRIVER TRAINING PROGRAM

by

Michelle Scully
Anna Devlin
Jennie Oxley
Jude Charlton

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Author(s):
Michelle Scully, Anna Devlin, Jennie Oxley & Judith Charlton

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Abstract:
Mobility is essential for general independence as well as ensuring good health and quality of life, and one of the most relevant and important activities of daily living for maintaining independence is the ability to drive, and this is particularly so for older adults. While it is generally acknowledged that many older drivers are safe and cautious drivers, making appropriate adjustments to their driving and travel behaviour, there is also evidence to suggest that there may be sub-groups of older drivers who do not adopt self-regulatory driving behaviours. These groups may be at higher risk of crash involvement compared with other sub-groups and may benefit greatly from targeted driver awareness, education and training programs. While there is a continued international recognition of the benefits of such programs, there are few existing programs in Australia. To address this gap, a new and innovative education and training program, ‘Seniors Driving Longer, Smarter, Safer’, was developed with the support and sponsorship of the NRMA ACT Road Safety Trust. This report describes the development of the program and a preliminary evaluation of its acceptability and effectiveness.

The aims of the ‘Seniors Driving Longer, Smarter, Safer’ program are to provide groups of older road users with knowledge about crash and injury risk, raise their awareness of the effects of ageing on driving performance and crash risk, and provide tips and strategies on maintaining safe driving practices for as long as possible. In addition, the resource outlines strategies for successful reduction and cessation of driving and alternative transport options for older people. The instructional materials required to operate the program are provided as attachments to this report. These include an instructor’s manual, powerpoint slides, materials for program activities and an information booklet for program participants.

Evaluations of the program were conducted with groups of older drivers to assess the program’s i) effectiveness in changing/improving overall knowledge of safe mobility and adoption of safe driving practices, and ii) acceptability by older drivers themselves. The findings suggested that attendance at the program resulted in a greater awareness of the impact of changing abilities on driving performance, some changed/improved attitudes to important road safety messages, and improvements in some driving behaviours and patterns. Moreover, the great majority of older drivers found the program to be very worthwhile, very informative, educational and useful.

Recommendations for further development and evaluation of the program are made, as well as recommendations for widespread implementation of the program in the community.

Key Words: Older driver, mobility, road safety, crash risk, education, training, behaviour, countermeasure,

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www.monash.edu.au/muarc

Monash University Accident Research Centre,
Building 70, Clayton Campus, Victoria, 3800, Australia.
Telephone: +61 3 9905 4371, Fax: +61 3 9905 4363
Preface

Project Manager:
Dr Jennie Oxley

Research Team:
Ms Michelle Scully
Ms Anna Devlin
Dr Judith Charlton
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EXECUTIVE SUMMARY

Driving is the safest and easiest form of transport for most older adults. Many seniors experience difficulty using other forms of transport, particularly walking. Continued mobility (and associated health, well-being, independence and quality of life) therefore requires access to a private vehicle for as long as it is possible to drive safely, or as a passenger. While there is a strong emphasis around the world for older people to maintain their mobility for as long as possible, their safety is also a serious community concern and one that requires innovative measures to reduce crash and injury risk. Indeed, older drivers are over-represented in serious injury and fatal crashes per distance travelled, compared with middle-aged drivers, and the number of older drivers involved is likely to increase in the coming decades as a result of the ageing population, increased car ownership and travel amongst older people.

Over the last few decades, many measures have been proposed to address the safe mobility of older drivers, all of which can be described within the general framework of the Safe System approach: safer roads, safer speeds, safer vehicles and safer road users. With regard to ensuring safer road users, there has been much focus on re-licensing procedures for older drivers, with many countries and jurisdictions imposing age-based license renewal procedures, with a range of screening tests to determine fitness to drive. However, many of these licensing procedures have been called into question with respect to their efficacy in reducing crash risk and implications of reduced mobility. Indeed, more recently there has been a call for more targeted identification of those older drivers who are most at risk (OECD, 2001; Stutts, Wilkins, Reinfurt, Rodgman & van Heusen-Causey, 2001; Fildes et al., 2004). Other promising road user strategies have focused on improving the driving practices of older drivers through education programs and resources.

The current project has drawn on findings of previous MUARC studies on driving experiences and behaviours of older drivers, particularly identification of some behavioural and travel factors that may contribute to increased crash risk, and concerns about those drivers who arguably should be self-regulating because of declining abilities, but who fail to adapt their driving behaviour accordingly, and those drivers (particularly women) who may lack up-to-date driving experience and confidence, and give up driving at an unnecessarily early stage.

These studies have identified a need for awareness, education and training programs, with a particular focus on the sub-groups of older drivers who may benefit greatly from driver education and training programs. Education and training to improve the driving practices of older drivers is central to current international thinking about this group’s safe mobility and there is increasing international recognition of the benefits of these programs. It is claimed, for instance, that if older people are able to adopt safer driving practices, then this will have a protective effect on crash risk and there will be less need for them to have to submit to periodic testing.

With the support of the NRMA ACT Road Safety Trust, a new and innovative education and training program, ‘Seniors Driving Longer, Smarter, Safer’, has been developed, taking into account our understanding of the issues surrounding the safe mobility of older road users, previous literature and international ‘best-practice’ in road safety education programs, general international ‘best-practice’ in adult education strategies, and feedback from groups of older road users. The program aims to provide ‘at risk’ groups of older road users with information about driving. The program is structured within a Safe System approach and designed to address four major areas addressing the safe mobility of older road users, including i) a
general awareness of crash and injury risk, ii) the impact of age-related functional changes on driving ability and safety, iii) use of alternative transport options, and iv) strategies to maintain safe driving.

During the development of the program, evaluations were conducted amongst small groups of older drivers to assess the program’s effectiveness in changing/improving overall knowledge of safe mobility and adoption of safe driving practices, and its acceptability amongst older drivers. The most encouraging finding here was the significant change, as a result of the program, in the extent to which participants had considered ways in which their abilities affected their driving. Participants (87%) indicated that they thought somewhat to a lot about these issues after attending the program (compared with 51% prior to attending the program). Other changes, while not statistically significant, included a higher likelihood of self-regulation by avoiding some difficult driving situations (such as driving at night, in the rain, on freeways, and driving through intersections without traffic lights) after attending the program compared with prior to attendance. It would be worthwhile conducting more research with a larger sample to explore changes in self-regulatory behaviours such as avoidance of difficult driving situations (such as driving at night, in the rain, on freeways, and driving through intersections without traffic lights). In addition, there was some suggestion that attendance at the program resulted in some changed attitudes to important road safety messages and changes in driving behaviour and patterns. Overall, participants’ acceptability ratings for the program were positive and encouraging. The majority of respondents found the program worthwhile, very informative, educational and useful.

The final product is a ‘ready-to-deliver’ program package. The package is designed for use by local governments, non-government organisations, community groups, practitioners and volunteers who either provide services to or work with older populations. The resource includes an Instructor’s Manual, a powerpoint presentation, Activity Materials/Instructions and a Driving Information Brochure for group sessions. The Instructor’s Manual sets out clearly the curriculum content including themes, key messages, activities, strategies for effective adult teaching/learning and instructions for delivery. It is envisaged that the resource can be implemented by relevant community groups and organisations including motoring clubs. Additionally, it is proposed that oversight of the resource by a coordinating body will be essential to ensure quality, consistency and relevance of the product and its delivery. Some recommendations for further research and promotion/distribution of the package are also provided.

Conclusions

Managing the safe mobility of older adults requires policies and initiatives that achieve an acceptable balance between safety and mobility. An effective way to manage the safe mobility of older adults is to assist appropriate adoption of self-regulatory driving practices. There is increased recognition of the benefits of education and training initiatives, particularly those targeting those most at risk because of a failure to adopt appropriate safe driving practices.

The ‘Seniors Driving Longer, Smarter, Safer’ program offers a promising road user-focused strategy to reduce crash and injury risk and maintain safe mobility. A large scale implementation and evaluation trial is needed to determine the efficacy of the program for improving/changing driving behaviours, reducing crashes and extending the safe mobility of seniors.
1. **INTRODUCTION AND BACKGROUND**

Driving is a fundamentally important part of today’s society and is an essential determinant of the quality of life of older individuals. Many older adults rely on driving to fulfil most of their transportation needs, and to maintain mobility and independence. While there is a strong emphasis around the world for older people to maintain their mobility for as long as possible, it is also important to ensure that they remain safe drivers.

This chapter outlines the crash and injury risk for older drivers and the contributing factors to their over-representation in serious injury crashes. It also discusses the importance of maintaining mobility amongst older populations and ways in which safe mobility can be maintained in later life.

1.1 **THE OLDER DRIVER SAFETY PROBLEM**

In terms of absolute numbers, older drivers are currently involved in fewer crashes. However, when figures are adjusted for any exposure measure (e.g., population, number of licensed drivers, distance travelled), older drivers represent one of the highest risk categories for crashes involving serious injury and death in most western societies (OECD, 2001). In Australia, too, crash rates reveal that drivers aged 75 years and older are at higher risk of death and serious injury compared with middle-aged drivers aged 25-60 years, even when such rates are adjusted for vulnerability (frailty) (Figure 1).

![Figure 1: Serious casualty crashes per billion km adjusted for vulnerability](image)

**Figure 1: Serious casualty crashes per billion km adjusted for vulnerability**

Source: ABS, 1995; FORS 1996

Much of the ‘older driver problem’ can be explained by frailty. It has been long recognised that older adults’ biomechanical tolerances to injury are lower than those of younger persons (Viano et al., 1990; Evans, 1991; Mackay, 1998), primarily due to reductions in bone strength and fracture tolerances (Dejeammes & Ramet, 1996; Padmanaban, 2001). Therefore the energy required to produce an injury reduces as a person ages (Augenstein, 2001) and this increases the likelihood of serious injuries among older road users involved in a crash. This
results in a larger share of older drivers’ crashes being included in casualty databases, thereby contributing to an apparent over-representation in crashes.

There have been various attempts to quantify the impact of frailty when explaining older drivers’ crash risk, with some variation in the subsequent estimates, according to the methods and data used. As a recent example, it was estimated that, fragility accounted for around 60-90% of the excess death rates amongst older drivers – with excessive crash involvement due to ‘other factors’ being largely restricted to drivers aged 80 years or older (Li, Braver & Chen, 2003). For these oldest male and female drivers, ‘other factors’ accounted for 37% to 43% of their overall fatal crash involvement.

Another explanation is related to driving distance and location of driving. While crash rates per distance travelled are generally seen as a robust measure for demonstrating older drivers’ crash risk, this measure is increasingly being called into question. It has long been known that independent of age, drivers travelling greater distances will typically have reduced crash rates per kilometre, compared to those driving shorter distances (Janke, 1991). Janke warned licensing administrators against becoming overly alarmed about older drivers’ apparent high crash risks based on per distance crash rates, without controlling for different annual driving distances.

Hakamies-Blomqvist, Raitanen and O’Neill (2002) empirically tested this hypothesis by using Finnish survey data to compare older and young middle-aged drivers’ crash rates, controlling for annual distances driven. When older drivers (65 years and older) were compared with younger drivers (26-40 years) who had equivalent driving exposure, there was no age-related increase in crashes per distance driven. The apparent age-related risk was attributed to yearly driving distances, in accordance with the reasoning by Janke, and not to age per se.

Both Janke (1991) and Hakamies-Blomqvist et al. (2002) attributed the mileage/crash association at least in part to different driving locations. High mileage drivers are more likely to use freeways and multi-lane divided roadways with limited access: low mileage drivers do more of their driving on local roads and streets, which have greater number of potential conflict points and hence higher crash rates per unit distance. Janke noted that there were 2.75 times more crashes per mile driven on non-freeways than freeways. Urban travel is even more likely to result in crashes for older drivers (Keall & Frith, 2004), given their well-documented difficulties in negotiating intersections (OECD, 2001; Oxley, Fildes, Corben & Langford, 2006).

A third explanation focuses on fitness to drive. The functional ability to safely operate a motor vehicle may be affected by a wide range of functional and health factors. There is widespread agreement that ‘normal ageing’ is associated with the onset of medical conditions, that the ageing process generally reduces or slows down sensation, perception, cognition, and physical functioning, and that most older adults experience some level of functional decline as they age. Many of these changes have safety implications. Safe and efficient driving requires the adequate functioning of a range of these abilities and loss of efficiency in any function can reduce performance and increase risk on the road. For example, Hakamies-Blomqvist, Sirén and Davidse (2004) identified arthritis, heart diseases, arterial hypertension, diabetes and the various forms of dementia as common age-related conditions. Stutts and Wilkins (2003) added that, as a group, older drivers have poorer visual acuity, reduced nighttime vision, poorer depth perception, and greater sensitivity to glare; they have reduced muscle strength, decreased flexibility of the neck and trunk, and slower reaction times; they are also less able to divide their attention among tasks, filter out unimportant stimuli, and make quick
judgements. There are a number of excellent reviews of functional and health issues and the relationship with driving, particularly those by Janke (1994) and Marottoli, Richardson, Stowe, Miller, Brass, Conney and Tinetti (1998).

While much research effort in the last decade or so has attempted to establish associations between various skills, medical conditions and crash risk, surprisingly few unequivocal relationships have been found between declines in single functions and crash rates (Charlton, Koppel, O’Hare, Andrea, Smith, Khodr, Langford, Odell & Fildes, 2004; Marottoli et al., 1998). Indeed, it is argued that moderate functional changes related to normal ageing do not appear to lead to a discernible increase in crash risk. Rather it seems that simultaneous deteriorations of several relevant functional and/or specific functional deficits linked to certain illnesses (especially those that lead to cognitive deterioration such as dementia) increases crash risk considerably (OECD, 2001). An attempt to show the relationship between age-related impairments and driving performance is shown in Table 1.

Many researchers now contend that the older driver ‘problem’ is mainly restricted to certain sub-groups of older people, rather than encompassing all older people and much of the recent research, therefore, has shifted from a general approach of why older drivers have high crash risk to focussing on identifying which older drivers are most at risk (OECD, 2001).

**Table 1: Age-related impairments and driving problems**

<table>
<thead>
<tr>
<th>Age-related Impairments</th>
<th>Driving Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased reaction time. Difficulty dividing attention</td>
<td>Difficulty driving in unfamiliar or congested areas</td>
</tr>
<tr>
<td>between tasks</td>
<td></td>
</tr>
<tr>
<td>Deteriorating vision, particularly at night</td>
<td>Difficulty seeing pedestrians and other objects at night, reading signs</td>
</tr>
<tr>
<td>Difficulty judging speed and distance</td>
<td>Failure to perceive conflicting vehicles. Accidents at junctions</td>
</tr>
<tr>
<td>Difficulty perceiving and analysing situations</td>
<td>Failure to comply with yield signs, traffic signals and rail crossings. Slow to</td>
</tr>
<tr>
<td></td>
<td>appreciate hazards</td>
</tr>
<tr>
<td>Difficulty turning head, reduced peripheral vision</td>
<td>Failure to notice obstacles while manoeuvring. Merging and lane changes</td>
</tr>
<tr>
<td>More prone to fatigue</td>
<td>Get tired on long journeys</td>
</tr>
<tr>
<td>General effects of aging</td>
<td>Worries over inability to cope with a breakdown, driving to unfamiliar places, at</td>
</tr>
<tr>
<td></td>
<td>night, in heavy traffic.</td>
</tr>
<tr>
<td>Some impairments vary in severity from day to day. Tiredness</td>
<td>Concern over fitness to drive</td>
</tr>
</tbody>
</table>

**SOURCE:** Suen and Mitchell (1998).
The full impact of the association between ageing, medical conditions, functional decline and reduced driving skills upon crash involvement is mitigated by older drivers themselves. Janke (1994) argued that reductions in skills do not necessarily translate into a higher crash rate over any given period of time for elderly drivers as a group, because of the group’s characteristic compensatory behaviours and voluntary limitations of their driving.

Indeed, many older drivers are aware of some functional decline and accordingly adjust their driving patterns to avoid travel under conditions which are perceived to be threatening or which otherwise cause discomfort (Eberhard, 1996; Smiley, 1999, Charlton, Oxley, Fieldes, Oxley, Newstead, Koppel & O’Hare, 2006). As examples of self-regulation, older adults typically regulate when, where, and how they drive and choose to reduce their exposure by driving fewer annual kilometres, making shorter trips and making fewer trips by linking different trips. Older drivers have also been found to limit their peak hour and night driving, restrict long distance travel, take more frequent breaks and drive only on familiar and well lit roads (together (OECD, 2001; Benekohal, Michaels, Shim & Resende, 1994; Charlton et al., 2006).

While self-regulation may be reducing older drivers’ crashes below expected levels, there is evidence that at least some older drivers are not regulating. For example, Stalvey and Owsley (2000) found that over three-quarters of a visually-impaired, high-risk group of older drivers did not self-regulate and did not see themselves as particularly susceptible to crashing.

Others, too, demonstrate that not all older drivers self-regulate their driving. For example, Charlton and her colleagues (2006) identified the characteristics of those who self-regulate and those who do not. Amongst their sample of drivers aged 65 years and older, those who were less likely to adopt self-regulatory behaviours (defined as driving less than 100 kilometres per week and avoiding specific driving situations) were more likely to be younger (<65 years), male, married, without a vision condition, and the principal driver of the household.

### 1.1.1 Conclusions about the ‘older driver problem’

Older drivers as a group have a heightened casualty crash involvement per distance travelled – and in such crashes are more likely than other participants to be injured or killed. Older drivers as a group are more likely to have some level of functional impairment and, at least intuitively, a reduction in some driving skills. However this latter factor is considered to have only a modest role in all older driver crashes, due to older drivers’ propensity to self-regulate, thereby reducing driving exposure (particularly to difficult or otherwise uncomfortable driving situations).

In explaining older drivers’ heightened casualty crash involvement per distance travelled, the research suggests that in addition to many of the usual factors affecting drivers of all ages, the following have a particular role:

- for almost all, physical frailty;
- for many, a high level of urban driving;
- for some, reduced fitness to drive.

Moreover, over the next few decades, increases in the number and proportion of older people in the population, increases in licensing rates, increased car use and dependency on the car,
will have implications for future crash levels amongst older drivers. In the US, Hu, Jones, Reuscher, Schmoyer and Truett (2000) attempted to project the crash risk for future generations of older road users, taking into account predicted driving behaviour, population migration, personal wealth and health, infrastructure and technological impacts. They predicted an overall 286 percent increase in fatalities from 1995 to 2025. Similar projections have recently been established in Australia (Fildes, Fitzharris, Charlton & Pronk, 2001). An overall three-fold increase in fatal crashes involving older drivers without active intervention was predicted.

The safe mobility of older drivers therefore is a serious community concern. While there have been many countermeasures suggested to reduce crash and injury risk amongst this vulnerable road user group, their crash rates remain relatively high and are expected to increase in the coming decades without innovative countermeasures.

1.2 THE BENEFITS OF INCREASED MOBILITY

Mobility is essential for general independence as well as ensuring good health and quality of life, and one of the most relevant and important activities of daily living for maintaining independence is the ability to drive. To most older people driving represents not only a means of transportation, but a symbol of freedom, independence, and self-reliance, and having some control of their life. A wide body of research shows that many older adults in motorised countries rely heavily on driving for most of their transportation needs and that older drivers are strongly interested in keeping their cars and licenses after retirement (OECD, 2001; TRB, 1988). It is suggested that older people who are mobile and drive have fewer health problems such as osteoporosis, hip fractures, and use fewer prescription drugs compared with those who do not drive (Waller, 1991). In addition, driving one’s own vehicle is associated with higher levels of life satisfaction, higher adjustment, less loneliness and better perceived control.

In contrast, forfeiture of driving privileges is considered a major loss by many older adults in terms of social identification, control and independence. There is no doubt that many older people report strong feelings about the importance of driving and the prospect of reduction and more particularly cessation of driving evokes a level of fear. For many, particularly those with a decline in health status, driving cessation is likely to lead to poor psychological outlook, life satisfaction, community engagement and quality of life, and increase in depressive symptoms, feelings of isolation, loss of self-consciousness, and a decline in out-of-home activity levels and community mobility (Harper & Schatz, 1998; Marottoli, Mendes de Leon, Glass, Williams, Cooney & Berkman, 2000; Harrison & Ragland, 2003). Further, for at least some people, the same health conditions and functional impairments that cause a change in driving patterns will also limit access to other transport options (walking, cycling, public transport), thereby further contributing to restricted community mobility and its consequences. Driving status thus plays a critical role in the complex interactions between ageing, physical and psychological health, community mobility and use of health services.

Unfortunately, as skills and abilities decline with age, it is inevitable that at some point, it becomes necessary for many individuals to consider reducing driving or retiring from driving. How and when this decision is made is likely to have an important influence on the driver’s experience and adjustment to life without driving. Cessation of driving may follow a gradual reduction in the amount and frequency of driving or suddenly when the consequences of some event leaves a person unable to drive. A person’s decision to stop driving may be voluntary (e.g., recognition of the situation or influence by others) or involuntary (e.g., loss of licence,
sudden onset of medical conditions) and forfeiture of driving privileges, whether voluntary or involuntary, is considered a major loss for many adults in terms of social identification, control and independence. Even curtailment of driving usually means relying on others for transportation, incurring potential inconveniences of public transport, or reducing the number of trips.

A number of studies have examined the factors that are associated with reduction and cessation of driving and generally conclude that health problems, little reason to drive, concern about crash involvement, licence cancellation, availability of others to drive and other transportation options, influence from family and doctors, and dislike for driving are major factors involved in the decision to cease driving (Stutts et al., 2001; Ragland, Satariano & MacLeod, 2004). Gender differences are also associated with the timing of driving reduction and cessation, and there is general consensus internationally that there is a higher likelihood of driving reduction particularly driving in stressful conditions (Gallo, Rebok & Lesikar, 1999; Charlton et al., 2004), and voluntary cessation at a younger age, for less pressing reasons and in better health by older women compared with older men (Hakamies-Blomqvist & Sirén, 2003; Rosenbloom, 2006). There is also evidence that women are more likely than men to give up driving prematurely even though they may still be capable of driving safely (Stutts, Wilkins & Schatz, 1999; Oxley, Charlton, Fildes, Koppel & Scully, 2004).

Despite the apparent perception by older drivers that stopping driving would be devastating, it is possible that if the process of retiring from driving is properly managed and planned, and drivers (and their families) are given guidance, information and strategies to make the transition from driver to non-driver smoothly, it should be a less stressful experience for older drivers. Indeed, some research suggests that there is a great difference in quality of life between voluntarily giving up a license and having it revoked by the authorities. Those who make the decision themselves and give up their license voluntarily are less likely to experience depression, loss of self-confidence and status to the same extent as those who have lost their license involuntarily (Oxley & Fildes, 2004). It is also reported that such life changes that are often associated with driving cessation may not be as severe for some and this may be linked with a range of demographic and other factors. Moreover, some have found that the recollection of loss amongst ex-drivers was more neutral compared with current drivers (Oxley & Charlton, 2009).

1.3 MANAGING OLDER DRIVERS’ SAFE MOBILITY

A review of older driver’s travel patterns and mobility needs (Whelan, Langford, Oxley, Koppel & Charlton, 2006) identified innovative strategies and initiatives to manage the safe mobility of older road users. These fall into four broad categories: safer road users (through behavioural, educational and training programs); safer vehicles (including continued occupant protection features in new vehicles, development of Intelligent Transport System (ITS) technologies, and raising awareness amongst older drivers of the benefits of driving vehicles that are comfortable and fitted with safety features); safer roads (for example, creating a safer and more forgiving road environment to match the characteristics and needs of older road users); and, provision of alternative transport options (including provision of accessible, affordable, safe and co-ordinated transport options tailored to older adults and promotion and awareness of alternative transport options amongst older drivers and their families and caregivers).

The range of recommendations from the Whelan et al., (2006) review demonstrate that maintaining the safe mobility of the elderly population will involve a co-ordinated approach
from a range of disciplines (including engineering, behavioural science/psychology, and medicine). Each of these groups of measures can have a positive influence on traffic participation, safety, mobility and associated quality of life. While there is good research evidence regarding the benefits of road and vehicle design improvements as well as provision of alternative transport options, the main focus of this report is on behavioural and educational approaches to improve the adoption of safe driving practices and strategies.

1.4 AIMS OF THE STUDY

Previous studies have suggested that many older drivers are safe and cautious drivers, making appropriate adjustments to their driving and travel behaviour. However, recent research at the Monash University Accident Research Centre (MUARC) (funded by the NRMA-ACT Road Safety Trust) has also identified key behavioural characteristics of older drivers that may contribute to increased crash risk (Charlton, Oxley, Scully, Koppel, Congiu, Muir & Fildes, 2006; Oxley, Charlton, Fildes, Koppel, Scully, Congiu & Moore, 2006). For example, Charlton et al (2006) found that ‘self-regulators’ (those who drove fewer kilometres) were more likely to be women, with low confidence and poor ratings of overall health, and aged 75 years or older. Overall, fewer than one-quarter of all drivers were found to be adopting self-regulatory driving behaviours. This study also raised concerns about those drivers who arguably should be self-regulating because of declining abilities, but who did not adapt their driving behaviour. Further, Oxley et al (2006) identified particular driving characteristics of older female drivers, reporting that lack of up-to-date driving experience and associated confidence, as well as declines in functional performance were associated with increased crash risk.

These studies have provided critical insights into the sub-groups of older drivers who may benefit from driver awareness, education and training programs. These studies also identified a need for such programs with a particular focus on ways older drivers can adopt safe driving practices in order to reduce crash risk and maintain good mobility. Education and training to improve the driving practices of older drivers is central to current international thinking about this group’s safe mobility and there is increasing international recognition of the benefits of these programs (Korner-Bitensky, Kua, von Zweck & Van Bentham, 2009). It is claimed, for instance, that if older people are able to adopt safer driving practices, then this will have a protective effect on crash risk and subsequently there would be less need for them to have to submit to periodic licence testing (e.g., Owsley, Stalvey & Phillips, 2003). This would represent a substantial community saving.

The NRMA-ACT Road Safety Trust recognises the importance of developing such educational and training programs, and commissioned MUARC to undertake this study. The overall aim of this study, therefore, was to draw and expand on the findings of previous MUARC studies and international resources in order to develop, trial and evaluate an innovative and effective educational and training program to improve older road users’ safe mobility.

Specific aims of this project were to:
1. Review current international ‘best-practice’ educational and training tools and other behavioural resources for older drivers;

2. Develop an innovative educational and training package incorporating the following three components:
   i) Workshop materials designed to raise awareness of the issues surrounding older driver safety (particularly the effects of ageing on driving performance and crash risk), informing drivers on strategies to adopt safe driving practices, and provide information on successful reduction and cessation of driving and alternative transport options.
   ii) Booklet providing supporting information,

3. Trial and evaluate the package in terms of user acceptability and effect on attitudes to driving; and

4. Provide materials for use by community groups involved with seniors in the ACT.

1.5 OUTLINE OF THE REPORT

The remainder of this report provides a detailed description of the development, trial and evaluation of the education and training package. Chapter 2 provides the results from the review of current international literature on ‘best-practice’ behavioural and educational measures for older drivers. The information is tabulated and includes descriptions, evaluations of efficacy (where known), and commentary (where possible) on the costs, and cost-effectiveness of resources.

Chapter 3 provides an outline of the educational and training package, the process undertaken to develop the contents of the workshop and booklet, and the results of the trial and evaluation.

Chapter 4 brings together the findings and discusses the overall effectiveness of the program, and implications for further research and distribution and promotion of the resource for widespread use in the Australian community.
2 REVIEW OF CURRENT RESOURCES

The first phase of this study was to gain an understanding of the benefits of educational and training programs for older road users, and to identify current best-practice internationally.

2.1 AN OVERVIEW OF BEHAVIOURAL AND EDUCATIONAL MEASURES FOR OLDER DRIVERS

Any effort to keep older adults driving safely for as long as possible will benefit their mobility. Educational, driving refresher and training programs aimed at promoting the adoption of safe driving practices and strategies have become popular approaches for addressing the safe mobility of older drivers. While their effects on crash risk and driver performance are rarely evaluated, they are regarded as an essential component of any strategy, particularly those that focus on improving driving awareness and behaviour (Kua, Korner-Bitensky, Desrosiers, et al., 2007; Korner-Bitensky, Kua, von Zweck & Van Bentham, 2008) and are, reportedly, well-received by many older community members. Moreover, these approaches are central to current international thinking about this group’s safe mobility and there is increasing international recognition of the benefits of these programs. It is claimed, for instance, that if older people are able to adopt safer driving practices, then this will have a protective effect on crash risk, will benefit mobility, there would be less need for periodic licence re-testing, and would reduce negative psychological consequences of losing one’s licence.

It is well documented that increasing age results in a subsequent increase in onset of medical conditions and impairments, and that older adults’ level of independence and mobility is often compromised due to the resultant impairments from some medical conditions (e.g., dementia, vision impairment, arthritis, neurological conditions, respiratory disorders, and falls) (Lyman, McGwin & Sims, 2001; Charlton, Koppel, O’Hare et al., 2004). Drivers suffering from medical conditions and resultant functional impairments often reduce their driving and suffer a subsequent loss of mobility. The same medical conditions and impairments are also likely to reduce an individual’s ability to use other transport options.

Despite the inevitable impact of these conditions on many everyday activities, at least some (including arthritis, cataract, stroke, dementia and perhaps a range of sensory conditions) could be managed so as to maintain adequate mobility and safety. While there is extremely limited evidence available on the treatment of medical conditions and their effectiveness in managing mobility and safety, Charlton et al. (2004) suggested some interventions. These include: development of reliable methods to identify and refer those who are potentially at risk as a result of medical conditions; promotion of public awareness about the safety risks for medical conditions; a review of licensing guidelines for fitness-to-drive, including use of restricted licences as a way of maintaining an element of mobility; and, investigation of the role of Intelligent Transport System (ITS) technologies to enhance safe mobility. The OECD also recommended the establishment of improved healthcare facilities to ensure maximum mobility and social inclusion (OECD, 2001).

In cases where training is not able to overcome a deficiency resulting from a medical condition, there is some evidence that education focussed on adoption of compensation mechanisms can be beneficial (Lyman et al., 2001). Such educational programs should include strategies such as: minimising the amount of driving done under conditions that impose a heavy perceptual and cognitive load (e.g., avoiding extensive driving in complex environments or driving in an unfamiliar environment: Kostyniuk, Streff & Eby, 1998;
Persson, 1993; McKnight, 1988); enlisting the cooperation of others to help share the driving load (e.g., having a passenger navigate or read the road signs: Kostyniuk, et al., 1998; Persson, 1993), and, for women, maintaining up-to-date driving experience and confidence (e.g., sharing the driving: Oxley & Fildes, 2000; Oxley et al., 2006).

For the older driver who seeks to independently raise their awareness of the issues surrounding safe mobility, to examine his or her own skills, or is encouraged by family members or other concerned individuals to do so, there are several education, training and self-screening instruments available. These programs can offer many benefits to older drivers as they attempt to identify and overcome specific problems or deficiencies by correcting them, or identify problems and teach compensation skills, and facilitate discussion within families about mobility options. While these types of programs are rarely evaluated, there are a few programs that appear to have some beneficial impact (e.g., ‘55-Alive Program’: Bédard, Porter, Marshall, et al., 2006; 2008; ‘UFOV training’: Roenker, Cissell, Ball, et al., 2003; ‘Driving Decisions Workbook’: Eby, Molnar, Shope, et al., 2003). The recent AAA Roadwise Review (Sherrets & Staplin, 2006) shows some promise but is yet to be evaluated.

While there is much value in promoting self-regulation, adoption of safe driving practices, awareness of changing functions and self-screening amongst older drivers, there are limitations. As warned by Molnar, Eby St Louis and Neumeyer (2007) and Staplin, Lococco, Stewart and Decina (1999), effective use of such instruments depends on absence of any serious cognitive impairment and, since cognitive impairment is likely to be related to elevated crash risk, some people in need of assessment may not be able to self-screen appropriately. Moreover, users must be motivated to answer questions honestly and consider the feedback seriously. Lack of motivation could prevent self-screening by many of those in need of it.

2.2 REVIEW OF EXISTING NATIONAL AND INTERNATIONAL EDUCATIONAL AND TRAINING PROGRAMS

The development of the training program involved an initial detailed review of existing educational and training programs for older drivers both nationally and internationally. A systematic literature search was conducted using online library catalogues, internet search engines, conference proceedings and contact with national and international experts in the field of older road user safety and mobility.

A range of educational and training programs and self-evaluation materials that aim to increase the safety and mobility of older drivers were identified and are listed in Table 2. A brief description is provided for each and, where available, a discussion of evaluations and effectiveness of programs is provided.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AARP 55-alive/Mature Driving Course**</td>
<td>Eight-hour education program designed to provide older drivers with information about effects of ageing on driving, compensation techniques, rules of the road, and defensive driving techniques.</td>
</tr>
<tr>
<td>AAA: Safe Driving for Mature Operators Course</td>
<td>Eight-hour sessions covering ageing effects on driving and reviews safe driving practices (looking far ahead, signalling, leaving a safety margin, a review of signs, signals and pavement markings, use of safety belts, and effects of medicine and alcohol on driving)</td>
</tr>
<tr>
<td>Mature Driver Retraining Workshop (Traffic Improvement Association)</td>
<td>Eight-hour driver safety course with optional on-road driving test. Program consists of a classroom review using ‘AAA Safe Driving for Mature Operators’ course material and psychophysical testing to allow individual to evaluate his/her own abilities. Psychophysical testing includes simple reaction time; visual capabilities (acuity and depth perception) and visual attention (UFOV). Within the driving course, instructor provides feedback on possible problem areas in the driver’s driving behaviour and offers suggestions for improvement.</td>
</tr>
<tr>
<td>National Safety Council Defensive Driving Course: Coaching the Mature Driver**</td>
<td>Coaching the Mature Driver was developed specifically to teach older drivers defensive driving techniques how to compensate for the physical and cognitive changes</td>
</tr>
<tr>
<td>AAA Drivers 55 Plus: Check Your Own Performance</td>
<td>16-page booklet contains 15 self-report questions regarding driving behaviors, vision &amp; health. Booklet also consists of suggestions older drivers can use to improve their driving performance. Discussion in these sections is organised around the 15 survey questions and includes several related safety tips. Also included are recommendations for restricting driving and warnings for older drivers to prepare for the day when they can no longer drive. The website also includes a booklet on “How to help an older driver” and “A flexibility fitness training package for improving older driver performance”</td>
</tr>
<tr>
<td>AARP Older Driver Skill Assessment and Resource</td>
<td>Self-evaluation</td>
</tr>
<tr>
<td>Program</td>
<td>Type</td>
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<tr>
<td>------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>Guide: Creating Mobility Choices</strong></td>
<td>24-page booklet that combines survey items and hands-on, self-administered tests. Throughout the instrument are educational statements that inform readers about automotive safety equipment and tips for safer driving.</td>
</tr>
<tr>
<td><strong>Driving Decisions Workbook</strong></td>
<td>Self-evaluation</td>
</tr>
<tr>
<td><strong>SAFER Driving: The Enhanced Driving Decisions Workbook</strong></td>
<td>Self-evaluation</td>
</tr>
<tr>
<td><strong>AAA Roadwise Review: A Tool to Help Seniors Drive Safely Longer</strong></td>
<td>Self-evaluation</td>
</tr>
<tr>
<td><strong>Knowledge Enhances Your Safety (KEYS)</strong></td>
<td>Self-evaluation</td>
</tr>
<tr>
<td><strong>Carfit</strong></td>
<td>Aimed to ensure the older driver is best fitted to their car. 6-page booklet and option of booking self-assessment through AAA.</td>
</tr>
<tr>
<td><strong>Expanding the Useful Field of View (UFOV)</strong></td>
<td>Training program</td>
</tr>
</tbody>
</table>

** Bold type indicates the program has been scientifically evaluated and results published.**
2.3 EVALUATIONS OF EXISTING EDUCATIONAL AND TRAINING PROGRAM

The training programs listed in bold font in Table 2 indicate that they have been evaluated, with the results published and disseminated to the road safety and scientific community. The methods used to evaluate and the respective findings are discussed below.

2.3.1 Evaluations of the 55 Alive/Mature Driver Training Program

The 55 Alive/Mature Driving program is a classroom based program that presents information on the effects of ageing on driving, general rules of the road and road signs, and strategies for reducing driving risk. Three reviews of the 55 Alive program were conducted using a sample of Canadian drivers. The first evaluation was a randomised control trial (Bédard, Isherwood, Moore, Gibbons, & Lindstrom, 2004). Sixty five participants took part in an on-road driving course conducted by a trained and certified evaluator from a Ministry of Transportation licensing examination department. The aspects that the examination focused on were the application of rules of the road and safe driving practices, including compliance, vehicle handling, route planning, observation and crash prevention practices. Following this, participants were randomly selected for treatment and control groups based on driving evaluation score, age and sex (both groups had equivalent age, sex, and driving scores). The treatment group participants were offered the re-training session, a Canadian Safety Council Adaptation of the 55 Alive program, and undertook a follow-up on-road driving test. The control group also completed a second on-road test (without re-training sessions). At the completion of the study, control group participants were offered the re-training session. Nine topics were covered in the training sessions including an overview, self-assessment, vision/hearing, normal driving situations, hazardous driving environment, driver guidance, the vehicle, alcohol and medication, and driver decision. The re-training consisted of two half-day sessions of three hours, which were led by one of three instructors in groups of 10-12. While the results showed an overall improvement in driving scores, there were no statistically significant differences between control and treatment groups.

A second evaluation of this program surveyed by telephone 367 drivers aged 55-94 years that had voluntarily attended the 55 Alive/Mature Driving course between January 1, 2000 and July 31, 2003 (Nasvadi & Vavrik, 2007). Respondents were asked both open-ended and closed questions in regard to what they could recall from the course, and how their driving may have changed as a result of attending. The majority of seniors (80%) indicated that they had found out about the course by themselves, through ads and print material, and the remainder were encouraged by someone else (e.g., family, friends, GP). Older men were significantly more likely than women to be referred to the course by another person. Of the men encouraged to attend by their spouse, almost 65% were aged 75 years or older. When comparing women aged 75 years and older with women aged 55-74 years, the younger women were twice as likely to recall information about the need for increased vigilance, five times more likely to recall techniques for improving visual skills, and three times more likely to recall specific information dealing with space margins. For men, there was no difference across age groups for types of information recalled. The most common lesson that was recalled was the need for increased vigilance. When asked what had changed regarding driving as a result of taking the course, almost three quarters of all men and women named at least one change. These fell into seven categories: increased awareness and visual skills (28.8% of men, 26.6% of women); change in attitude (e.g. more confident, more polite, more patient) (13.6% of men, 13.4% of women); use better speed and space (12.6% of men, 13.1% of women); avoid hazardous conditions (4.2% of
men, 9.0% of women); more cautious (16.8% of men, 8.6% of women); obey road rules and signs (8.4% of men, 4.8% of women); and, improved manoeuvres (4.2% of men, 5.5% of women). Of the avoidance of hazardous conditions the most frequent situation was left-hand turns, followed by avoidance of reversing out of a parking stall, avoidance of night driving and avoidance of bad weather. Eight men and six women said they had stopped driving one to two- and a half years ago. Although this corresponded with the time at which they attended the course, none of the participants suggested that the course actually encouraged them to stop. When asked why they ceased driving this was generally due to health reasons. Among all respondents who were still driving only three men and eleven women, said they had made plans to stop driving in the future. Whilst all participants rated their driving skills fairly high, men were twice as likely as women to report an improvement in driving skills following the training program. More than two thirds of all participants said that the course had helped to increase their confidence about their driving abilities. Whilst the rating of confidence was not statistically significant between men and women, there was a greater proportion of younger men aged 54-74 compared to older men who said the course had increased their confidence. Two men aged over 75 and one younger man said they felt less confident after the course, although they continued to drive. These men also said that they course made them more aware of the risks of driving. Nasvadi and Vavrik (2007) saw the main finding of the survey to be the fact that the majority attending the training program felt that they had changed something about their driving as a result of attending the program.

The third evaluation of the 55 Alive/Mature Driving program compared crash rates of 884 older drivers aged 55 years and older who had attended the program with overall crash rates of drivers matched by age, gender and postal code region within the province of British Columbia, Canada (Nasvadi & Vavrik, 2007). Courses were held in major urban centres and in smaller cities that draw from both urban and rural populations. Insurance data, crash history and other details of participants were obtained. A crash was included only if it was deemed that the driver was at least 25% liable. Crash rates for a 2 year period prior to attendance of the 55 Alive/Mature Driving course were compared with controls. Results showed that during the two years prior to attending the course, 145 participants filed one or more insurance claim. This was significantly more than the 85 controls who filed at least one insurance claim during the same period. Nasvadi and Vavrik (2007) argued that these results suggest a self-selection bias that exists among seniors attending remedial driver education programs. That is, seniors attending the course were more likely to have been involved in at-fault collisions prior to the course. In order to test these finding further, crash rates of the case group for the same two-year period prior to attending the course were compared with a new matched control group of drivers selected from the British Columbia crash database. The data comparing those attending the course with controls was highly skewed, with only six participants experiencing more than one crash following the course date. The data was then dichotomized to crashed versus non-crashed drivers. Logistic regression indicated that the odds of being involved in a crash were slightly higher for the study participants than the controls (OR=1.15), but this difference did not reach significance. The data were also separated into two age categories, 55-74 years, and 75 years and older. Older drivers who attended the course had a 1.5 times greater odds of being involved in a crash than their matched controls (p=0.08). Male drivers aged 75 years and older who attended the course were 3.8 times more likely than their matched controls to be involved in a crash (p=0.05). Younger males had fewer post-course crashes than controls but the difference was not statistically significant. There were no such differences for women.
To gain further insight into these findings, focus group sessions with twenty-five males aged 63-90 years that attended the course were conducted. Responses of those drivers who had made a claim both prior to and after taking the course (‘Crashers’) were compared with drivers who had no crashes either before or after the course (‘Perfects’), and those who had been involved in a crash in the two years prior to taking the course (‘Pre-crashers’). Results indicated that ‘Crashers’ were less likely to recall specific items of the course compared with ‘Perfects’ and ‘Pre-crashers’. In addition, they were less likely to cite alternate reasons for attending the course, other than their wives playing a prominent role in encouraging them to attend, whereas the Perfects and Pre-crashers also cited the need to re-evaluate their driving skills and to keep abreast of changes in their driving. ‘Crashers’ were also less likely than the other two groups to readjust their goals to allow for modification of driving practices (e.g., scheduling appointments into one day in order to limit the number of days needed to go out). All participants in the ‘Crashers’ group were also the primary drivers in their household and most indicated that they were the ones that always drove when travelling with their spouse or friend. In comparison, many participants in the other two groups indicated that they shared the driving task with others. Finally, when asked about attitudes toward driving, ‘Crashers’ were more likely to blame other road users, particularly younger drivers, whereas the remaining participants also acknowledged their declining skills due to ageing. All ‘Crashers’ were still driving and indicated the strongest emotional links to driving whereas some of the remaining participants had ceased driving or had reduced their driving.

Most recently, Bédard and his colleagues found significant improvements in driving performance for those who received a combination of the 55-Alive.Mature Driving Program and an on-road education/training component compared with a control group who did not receive any intervention (Bédard et al., 2008). A total of 75 participants (38 intervention group; 37 control group) were recruited. The intervention group received the in-class education designed to help improve driving skills and maintain independence in two, 3-4 hour sessions, and the on-road education component that focussed in concepts discussed during the class session (two 30-40 minute sessions with a certified instructor).

Comparisons of knowledge of safe driving practices (through questionnaire) and on-road driving skills (assessment of safe and unsafe actions in various traffic conditions) before and after the intervention were performed. Results showed that the intervention group improved significantly in the driving knowledge questionnaire with an increase from 61 percent questions correctly answered at baseline to 80 percent at follow up. Unfortunately the authors did not report results for the control group. The on-road evaluations were divided according to five types of driving actions: i) starting/stopping/backing, ii) signal violations/right of way/inattention, iii) moving in the roadway, iv) speed/passing, and v) turning. There was a greater reduction in demerit points in the intervention group compared with controls for the driving actions related to moving in the roadway.

The results of these four studies point to an overall benefit of the training program in improving driving practices, however, the findings regarding an effect on crash risk were less conclusive. Those who had been involved in a crash prior to and after attending the course were distinctive in their driving patterns, and attitudes to driving, compared with those who had not crashed, or those who had only crashed prior to attending the course. There may be many factors at play here, and a greater understanding of the effectiveness of the training program on these factors combined is required.
2.3.2 Evaluation of the Wiser Driver Course

The Hawthorn Community Education Project developed the Wiser Driver Course for older drivers. This program aims to provide older drivers with knowledge about road safety, changes in road rules, licensing arrangements, as well as raising awareness about age-related changes that can affect driving performance. Although it aims to help older drivers continue driving, strategies for giving up driving and coping with life after driving are also discussed. It is a short course that is run for two hours every week for four weeks, and there is an enrolment fee of $10-15 per participant. Each group consists of 10-15 participants who sit around a table with a trained tutor, but who is not an expert in road safety. Learning material consists of printed information provided at each session, and video segments which allow for the discussion of sensitive topics such as life after driving. A member of the Police force or road safety expert attends one of the sessions so that local traffic conditions can be discussed.

The course was evaluated over a two year period which included twenty courses. Participants completed a survey at the beginning of the course, as well as three months after the course. Driving behaviour and road safety knowledge was assessed in terms of driving history, car details, driving frequency and purpose, crash involvement and infringements, and use and knowledge of alternative transport. At the beginning of the course participants expected to update their road rules, and maintain driving skills with age. After completing the course, 80 percent of participants responded positively to the question “since doing the wiser driver course, do you think that you have changed your behaviour in any way?” The majority indicated the change occurred to a little or moderate degree. After comparing the before and after survey items, 63 percent of participants indicated a change on 1-4 items. The two items on which participants reported the most change were discussing driving with others and managing difficult traffic conditions. Self-assessed measures of change listed on the final survey consisted of increased awareness and an appreciation of being kept up to date with road rules. The course convenor attributed the success of the course to the voluntary enrolment procedure, the matching of participant expectations to the course criteria, and the course format.

2.3.3 Evaluation of the Driving Decisions Workbook

The Driving Decisions Workbook (DDW), developed by the University of Michigan Transport Research Institute (UMTRI), is a self-assessment booklet, designed to increase self-awareness and general knowledge amongst older drivers. The booklet provides series of questions divided into five sections addressing the following aspects of safe mobility: on the road; seeing; thinking; getting around; and health. For each question there are recommendations to compensate for the decline of certain abilities and strategies offered to maintain safety. An initial evaluation of the DDW was conducted amongst 99 licensed drivers aged 65 years and older who completed the DDW, a road test, and a questionnaire (Eby et al., 2003). The questionnaire consisted of 27 items aimed at identifying self-reported changes in self-awareness and general knowledge following the completion of the DDW. The driving test was 7 miles, and included specific manoeuvres in particular locations (e.g., controlled right and left turns, uncontrolled right and left turns, and lane change) and took approximately 15 minutes to complete. For every manoeuvre an examiner in the vehicle scored up to 17 performance tasks (e.g., use of signals, checking mirrors, etc). A failure to meet the scoring criteria for a performance task resulted in an error for that task. The examiners were tested prior to the drive to ensure that inter-examiner reliability was at least 85 percent. On average, it took participants 30 minutes to complete the DDW, with older participants (aged 75 and above) taking, on average, 7
minutes longer than younger participants (aged 65 to 74 years) to complete the DDW. There were few gender differences in completion times.

The results of the questionnaire items on self-awareness and general knowledge indicated that the great majority of drivers (96.9%) thought that the that the booklet was a useful reminder of things that they already know (96.9%), that the participants read the feedback in the booklet next to the question even if their answers did not point to feedback (99%), and that booklet made participants more aware of changes that affect driving (76.5%). However, a much lower proportion of responses to questions relating to changes in driving were found. Less than a quarter of drivers (23.7%) reported that they would change their driving in the future based on the feedback of the DDW. Even less (14.1%) reported that they had discovered changes in themselves by reading the DDW. The large majority of participants believed that the DDW was either very or somewhat useful (93.9%), could be useful for helping older adults discuss driving concerns with families (100%), and that they would use the DDW again if it were publicly available (72.4%). These findings suggest that DDW is generally viewed by older drivers as a positive resource, is fairly successful in increasing self-awareness and knowledge (the primary goal of the evaluations), but it appears unlikely that the DDW feedback is sufficient to promote changes in driving (arguably the primary goal of training).

The scores on the DDW were calculated for the three domains (health, driving abilities, and experiences/attitudes/behaviors) across the five sub domains (medical conditions, medications, vision, cognition, motor) and correlated with the on-road driving test scores. The overall DDW score and overall on-road driving test score was positively correlated and statistically significant, suggesting that, an increase in identified potential problems was associated with an increase in observed performance task problems during driving. Further, an analysis of the DDW domains indicated that both abilities and experiences/attitudes/behaviours correlated significantly with on-road driving performance. Analysis of the sub domains indicated that overall cognition and psychomotor skills were significantly related to driving performance, and that there were clear age and gender differences. All but one of the correlations (medication) for men were positive and significant, but only the cognition and psychomotor ability sub domains were significant for women. Higher correlations between DDW score and driving performance were found for younger drivers (aged 65 to 74 years) compared with older drivers aged 75 years and above. The authors concluded from these results that performance on the DDW were more closely related to actual driving for men and those who were aged 65 to 74 years of age, and that while it is a useful tool, it is best suited as a first-tier assessment instrument and educational tool for older drivers.

A subsequent pilot evaluation of the SAFER Driving: Enhanced Driving Decisions Workbook was conducted by Eby and his colleagues (cited in Molnar, Eby, St Louis & Neumeyer, 2007). In preliminary testing with 68 older adults, results from the self-screening were compared with results from a clinical evaluation and an on-road driving assessment administered through the University of Michigan Drive-Ability program. The self-screening instrument was found to correlate with both the clinical evaluation and on-road driving assessment. In addition, participants reported that they were more aware of changes than can affect their driving as a result of completing the instrument and were prepared to use it in the future and recommend it to others.
2.3.4 Evaluations of the Knowledge Enhances Your Safety Program

The Knowledge Enhances Your Safety (KEYS) is an educational program that aims to promote the performance of self-regulatory practices in drivers with impaired vision. It is designed to change self-perceptions about vision impairment and how it can impact safe driving, and to promote avoidance of hazardous or risky driving situations through self-regulation and reduced driving exposure. Owsley et al. (2003) conducted an evaluation of the program amongst a sample of 365 high-risk older drivers (mean age of 74 years, 69% male and 31% female) using a case-control study design and analysed the effect of the program on self-reported attitudes about vision impairment and driving, and self-reported driving behaviors. Participants were aged over 60 years, legally licensed to drive in Alabama, had been involved in a state-recorded crash in the previous year, drove at least 5 days per week and/or at least 100 miles per week, had minimal or no cognitive impairment defined as a Mini-Mental Status Examination (MMSE) of 23 or higher, and had a visual impairment. The latter was defined as visual acuity between 20/30 and 20/60, or a restriction in the useful field of view, defined as scores 40% or greater as measured using the UFOV test. Participants were randomly assigned to the case or control group.

All participants completed an eye examination and the case group also received the KEYS program. The program was delivered on a one-on-one basis over two sessions. The first session was within 2 weeks of the eye examination and involved discussions of the eye examination results between the participant and a health educator. The aim of this discussion was to provide information to increase self-awareness of vision impairment and its impact on safe driving. Participants were also shown eight hazardous driving scenes to facilitate detailed discussion of the potential dangers in these situations. These scenes were based on the level of visual difficulty, and the statistically high crash rates occurring at these locations. This content is a world first. After identification of dangers, participants were asked to consider eight strategies that could be used to avoid the hazard. For example, looking for a left-turn arrow, driving to the next block and making three right-hand turns. Drivers were also motivated to indicate additional self-regulatory strategies consistent with their driving needs so they could be easily incorporated into their routine driving habits. Each participant was asked to set specific goals for behaviour change, and was encouraged to work toward achieving these goals prior to the second session. The second session was administered one month later, included a one hour ‘booster’ discussion to reiterate topics covered in the previous session. The main focus was the progress made towards behavioural goals and strategies to continue safe driving behaviors in the future. The primary outcome measures were compared before and at 6-months following randomisation.

Self-rated eyesight was assessed by an item from the National Eye Institute Visual Function Questionnaire-25 asking participants to rate their eyesight from excellent to very poor. Self-perception of driving difficulty evaluated perceptions about the impact of vision impairment on driving with respect to eight hazardous driving situations including rain, driving alone, parallel parking, left-hand turns, interstate, heavy traffic, rush-hour, and night). This was measured from a subscale of the Driving Habits Questionnaire (DHQ). A subscale of the DHQ was also used to measure driving avoidance of hazardous situations and driving exposure. Driver dependency was assessed using another subscale of the DHQ (questioning who they travel with in the car and who usually drivers). Attitudes toward driving safely and self-regulatory practices were both measured by sub-scales of the Driver Perceptions and Practices Questionnaire (DPPQ).
The results showed that those who participated in the KEYS program were more likely than those who did not to indicate that they had less than excellent eyesight, and more difficulty with visually challenging driving situations than the controls. The results of driver behaviour measures indicated that the intervention group reported more frequent performance of self-regulatory practices, avoidance of hazardous situations, were not likely to increase their dependence on others to drive, and a greater reduction in driving exposure compared with the control group. There was no statistically significant difference between groups on attitudes toward driver safety. It was concluded that the results are consistent with the notion that, by educating older adults, changes in attitudes about vision and driving can result. Generally, previous studies have only included increased knowledge as the primary outcome measure but the current study also demonstrates self-reported perceptions about one’s visual status and its implication for driving can change.

Owsley, McGwin, Phillips, McNeal and Stalvey (2004) published a further evaluation of their KEYS program examining crash involvement amongst a sample of 403 high-risk visually impaired older drivers in a randomised controlled single-masked intervention. Participants inclusion criteria and study design was the same as the study described above (Owsley et al., 2003) but this time reporting the results of additional post-intervention telephone surveys conducted 12-18- and 24-months after randomisation. The results showed an overall decline in mileage by both the intervention and control group, however, the rate of decline in the intervention group was statistically higher than the control group. In comparison with baseline measures, the results of driving avoidance, and self-regulation showed a statistically significant difference between the intervention and case groups, with the intervention group having higher avoidance and self-regulatory scores than the case group. Regardless of whether the crash rate was measured as persons-years or person-miles, there was no statistically significant difference in the rate of crash rate between intervention and control groups. It was concluded that, whilst the KEYS program did not enhance driver safety in terms of lowered crash rates, it was associated with increased self-regulation and avoidance of challenging driving situations.

2.3.5 Evaluation of a Canadian Program

Tuokko, McGee, Gabriel, and Rhodes (2007) examined beliefs and attitudes toward driving amongst a group of 86 (28 male and 58 female) older drivers after attending an older driver education session. Response measures included locus of control, expectation of crash, beliefs and attitudes concerning self driving behaviour and other drivers’ behaviour, and openness to change. The majority of drivers indicated an internal locus of control in regard to their susceptibility for being involved in a crash with 95 percent indicating that they had the skills to safely get out of a dangerous driving situation, and 91 percent indicating that they had the ability to influence the occurrence of a car crash. Seventy-three percent of participants believed that those who drink and drive are most at risk of being involved in a crash whereas 22 percent thought young drivers were the ones most at risk. Three-quarters of the participants believed that they should be able to get in their car and drive whenever they want. Almost all participants (98%) believed that drivers with illnesses that might affect their driving should undergo screening evaluation, and some people should be denied the right to drive (84%). When asked about who should make the final decision about driving cessation, less than half the participants (45%) thought a doctor should decide and less than a quarter (22%) thought that a government department responsible for motor vehicle licensing. Interestingly, only 20 percent believed the decision should be up to the driver themselves. Sixty percent of respondents indicated that changing when and where they drive was possible. Of the remaining 40 percent of respondents, many argued that changing their driving was not possible because public
transportation was inconvenient and/or due to demands of their lifestyle. Less than one third of respondents reported engaging in any compensatory behaviors such as restricting their driving (29%). Of those that did engage in compensatory behaviours were older, and more likely to be female. The most common restrictions were limiting driving to the daytime, local routes, and good weather conditions. A large proportion of respondents (85%) reported at least one driving situation as being stressful (however, they did not report that they were at a greater risk of being involved in a crash in these situations). While this study provided interesting insights into drivers’ beliefs and attitudes toward driving and adoption of compensatory behaviours, there was little discussion on the efficacy of the driving program on promoting the adoption of safe driving practices.

2.3.6 Evaluation of Expanding the Useful Field of View (UFOV)

This training program aims to improve the UFOV through training which is provided on the detection of briefly presented targets under varying attentional demands to increase the amount of information that can be processed in a given amount of time. Training takes place over a 10-day period or until some criterion level of performance is achieved. An evaluation of the assessment and training product was conducted with twenty-four participants in three age groups (22-33 year, 40-49 years and 60-75 years). Four factors that influence the field of view were investigated. Follow up evaluations over a period of 6 months after completing training sessions were conducted to assess the longevity of the improved visual performance. While it is noted that the size of the UFOV varies by age and typically diminishes with age, the findings indicated that some of the shrinkage can be reversed with a small amount of practice. The effects of training were found to persist over time (at least 6 months) (cited in Molnar et al., 2007).

2.4 SUMMARY

In sum, assessments of the effectiveness of any road safety initiative are important strategies to clarify their benefits/disbenefits. Unfortunately, evaluations of behavioural interventions are rarely undertaken and therefore the evidence on effectiveness of older driver education and training is limited. Nevertheless, from the available data, there are sufficient demonstrated benefits of such resources, and further development and refinement of training programs is warranted. Moreover, rigorous evaluations of these initiatives should be encouraged.
3 DEVELOPMENT AND EVALUATION OF ‘SENIORS DRIVING LONGER, SMARTER, SAFER’

The first section of this chapter describes the processes undertaken to develop the education and training program ‘Seniors Driving Longer, Smarter, Safer’, including a review of current ‘best-practice’ in adult education strategies, the of selection of themes, and selection of self-assessment exercises.

The second section of this chapter presents the results of the trial and evaluation of the program.

3.1 CURRENT ‘BEST-PRACTICE’ IN ADULT EDUCATION

Part of developing an effective program or educational course is for instructors to have a good understanding of how adults learn best. Therefore, an important component of developing the program was to review the literature on educational research and adult learning styles to ensure an optimal learning environment.

The literature review revealed a number of key indicators and research strategies to ensure an optimal approach to motivate and educate adults. The general consensus in the literature is that, compared to children and teens, adults have special needs and requirements as learners and they approach learning differently, and this is mainly due to their life experience. Generally, educational research and adult learning style guidelines and literature (e.g., Zemke & Zemke, 1984; ICVET, 2007) focus on adults’ motivations for learning and suggest there are six major motivators for learning including i) Social relationships, ii) external expectations, iii) social welfare, iv) personal advancement, v) escape/stimulation, and vi) cognitive interest. The following key points are made in the literature:

- Adults support themselves, are autonomous and therefore are generally self directed. Adult learners need to be free to direct themselves. Strategies instructors can use here are to actively involve adult participants in the learning process and serve as facilitators for them. Specifically, instructors should get participants' perspectives about what topics to cover and let them work on projects that reflect their interests, allowing participants to assume responsibility for presentations and group leadership. They have to be sure to act as facilitators, guiding participants to their own knowledge rather than supplying them with facts;

- Adults seek out learning experiences to cope with life-changing events such as retiring from work and tend to expect that learning will be rewarding. Adults have accumulated a foundation of life experiences and knowledge that may include work-related activities, family responsibilities, and previous education. They need to connect learning to this knowledge/experience base. To help them do so, instructors should draw out participants' experience and knowledge which is relevant to the topic, relate theories and concepts to the participants and recognize the value of experience in learning;

- Adults are goal-oriented and tend to learn when they need to in order to solve a problem or fulfil a need. Therefore, adult participants usually know what goal they want to attain and appreciate an educational program that is organized and has clearly defined elements. To be effective, instructors can demonstrate to participants how the program will help them attain their goals;
Adults are relevancy-oriented and have their own ideas about what topics/concepts/skills are important to learn. It is therefore important that they see a reason for learning something. Learning should be applicable to their work, daily activities or other responsibilities to be of value to them. Therefore, instructors must identify objectives for adult participants before the course begins. This means, also, that theories and concepts must be related to participants’ existing knowledge and a setting familiar to participants and allow them to use all of their senses to learn;

Adults are practical, generally concerned about effective use of time, and focus on the aspects of a program that are most useful to them in their daily life. They may not be interested in knowledge for its own sake. Instructors should tell participants explicitly how the lesson will be useful to them to undertake their daily activities, allow them opportunities to practice their new skills and apply their new knowledge, allow them adequate time to make sense of and value new information, and provide specific feedback on their progress; and,

Adults draw on their life experiences in order to relate new learning and are more likely than children to reject or explain away information that contradicts their experiences or beliefs. Instructors should show respect, acknowledge the wealth of experiences that adult participants bring to the classroom, ensure they are actively involved in the learning process, and should treat participants as equals in experience and knowledge and allow them to voice their opinions freely in class.

Some additional effective teaching strategies include:

- An awareness that adult learning occurs within each individual as a continual process throughout life. People learn at different speeds, so it is natural for them to be anxious or nervous when faced with a learning situation. Positive reinforcement by the instructor can enhance learning, as can proper timing of the instruction.

- Knowledge that learning results from stimulation of the senses. In some people, one sense is used more than others to learn or recall information. Instructors should present materials that stimulate as many senses as possible in order to increase their chances of teaching success.

- An understanding of the importance of motivation. If participants do not recognize the need for the information (or have been offended or intimidated), all efforts to assist the participant to learn will be lost. Instructor should therefore establish rapport with participants and prepare them for learning – this provides motivation.

In summary, successful delivery of programs requires substantial responsibility on the part of the instructor. While there are many barriers to learning, there are principles and effective strategies that developers of programs and instructors can apply to ensure a more rewarding and effective experience for participants and therefore enhance the effectiveness of their program. Adults seem to learn best and apply their knowledge when they feel comfortable with the learning environment and they attempt tasks that allow them to success within the contexts of their limited time and demanding lives, they provide input into the planning of their own learning goals and processes, they have opportunities to engage in social learning, they have a variety of options appropriate to their learning styles, they are able to associate new learning with previous experience and to use those
experiences while learning, and they have an opportunity to apply theory/information to practical situations in their own lives.

3.2 APPLICATION OF ADULT LEARNING PRINCIPLES AND GUIDELINES IN DEVELOPING PROGRAM DELIVERY AND THEMES

Based on the above understanding of adult learning styles and principles of effective teaching, the ‘Seniors Driving Longer, Smarter, Safer’ training program was developed to ensure optimal motivation and retention/application of information. The materials developed for this program are presented in Appendices A-D. Here, descriptions of the delivery characteristics and program content are provided.

3.2.1 Delivery characteristics

A number of appropriate delivery principles and strategies were adopted in the delivery of the program and were incorporated in the overall guidelines in the instructor’s manual (Appendix A) which contains detailed information for each powerpoint slide and instructions to conduct activities in all program sessions. A summary of these strategies is provided below.

Overall, it was considered of great importance that messages were delivered in a positive, encouraging and enthusiastic manner to all participants attending to address all motivational factors.

The needs, well-being and comfort of all participants were also considered a priority throughout the training program. Broadly speaking the presenter’s role in the training program was to facilitate discussion from participants, set-up and explain activities, provide information based on scientific evidence, and to generally ensure all participants are engaged and comfortable.

To address the principles of respect, comfort, and time effectiveness, morning and afternoon tea break times were flexible, and presenters were directed to offer participants the flexibility to decide when the group takes a morning tea break. In addition, instructors were directed to inform participants at the beginning of sessions as to the length of each session to maximise their concentration. In return, instructors were directed to encourage participants to turn off or switch electronic devices to silent mode in order to create a learning environment with minimal distractions.

To address the principles of self-direction and goal-oriented motivation, the program was designed to ensure that participants were encouraged as much as possible to be actively involved in the training program by providing feedback, ideas, comments, etc. It was considered most desirable for participants themselves to discover ideas or uncover problems, with guidance from instructors, rather than instructors merely presenting information and problems to participants. As an example, the first section on common crash types involving older drivers was designed to encourage participants to identify, suggest and share experiences and knowledge of crash types rather than the instructors automatically showing a slide of crash types. Instructors were also directed to encourage participants to ask questions, and provide comments throughout each session of the training program in order to support the content of the training program.

Communication between participants was also encouraged to enhance self-discovery. One example of a method to facilitate communication between participants was to ensure that any suggestions or comments by individual participants were clear, clearly heard by the
group and directed toward the group as a whole, rather than directed at the instructor, and repeated if necessary to the group and invite feedback, comment and discussion. A second example to facilitate communication between participants was to break up into small work groups for short periods to discuss topics and then have one member of each group report back to the whole group. This second example was used throughout the duration of the training program.

Continual chatter amongst two or more participants away from the overall discussion was likely to be a sign of boredom, fatigue and/or lack of concentration. Presenters were given examples of techniques to ensure good concentration and attendance to the program activities at all times. For example, instructors were requested to be cognisant of these distractions and encourage those chatting to maintain attentiveness to the program by asking one of them a question and drawing them back into the discussion. Alternatively if presenters believed that a large number of participants were lacking concentration, they were asked to suggest either a 5-min break in addition to the scheduled breaks, or to have a scheduled break earlier than planned based on the consensus of participants.

In addition to these strategies, the overall set-up of the program was designed to maximise concentration, interest, self-learning and motivation. It was considered optimal for the training program to be conducted over a two-day period, and designed for approximately 12-18 participants.

### 3.2.2 Program content characteristics

The contents of the program were developed using evidence-based research on older driver safe mobility and world’s ‘best-practice’ approaches to keep older drivers safe and mobile, and structured within the Safe System framework.

Australia has recently adopted the Safe System approach to road safety which requires all aspects of the transport system (i.e., roads, vehicle speeds, vehicles, and the users of the system) to work together for the safest possible outcomes. For its success, the Safe System relies on system users to comply with key road rules and the designers and operators of the road-transport system to successfully manage kinetic energy within the system. A key task of the Safe System therefore is to manage vehicles, the road infrastructure, speeds, and road users, and the interactions between these components, to ensure that when crashes do occur, crash energies will remain at levels that minimize the probability of death and serious injury. Put another way, designers and operators are responsible for providing ‘5-star’ roads and the vehicle manufacturers ‘5-star’ vehicles, all used by ‘5-star’ people always complying with key road rules.

The training program was designed to provide groups of older road users with knowledge about crash and injury risk, raise their awareness of the effects of ageing on driving performance and crash risk, and provide tips and strategies on how to maintain safe driving practices for as long as possible. In addition, strategies for successful reduction and cessation of driving and alternative transport options are provided.

The final training program consisted of four discrete components:

1. Discussion of risk situations and crash types;
2. Functional assessments;
3. Alternative transport and mobility options; and,
4. Strategies for managing and decreasing risk.

The program was designed to be run in a ‘classroom’ setting, with speakers presenting information with the aid of powerpoint slides and group activities. An overall description of each session is provided below:

Session 1: Overall introduction and presentation of crash and injury risk

This first session sets the scene for the program, methods of introducing presenters and participants, and discussing the aims of the program and providing a schedule of the workshops. Following this, a presentation of crash and injury risk to older drivers is given, focussing on the importance of mobility, future demographic changes, crash statistics, challenging driving situations and crash types.

Session 2: Awareness of functional abilities

The second session aims to raise the awareness of the impact of age-related changes in functional abilities on driving behaviour and performance. Presenters are given clear instructions on how to conduct these activities, and, for each activity, participants are given written instructions to carry out the activities. Following the activities, presenters summarise the evidence of these changes as they relate to driving ability.

This session requires the use of a number of computer-based and pen and paper functional assessment tools and ‘props’ aimed to demonstrate changes in visual, perceptual and attentional, cognitive and memory, and physical abilities. The assessment tools used in this session are: the Useful Field of View Test (UFOV: Ball & Owsley, 1991), the Motor Free Visual Perception Test (MVPT-3, Colarusso 1972), the Trails Test parts A and B (Reitan, 1958), and a hazard perception task (Regan, Triggs & Deery, 1998).

In addition, a number of props were used to demonstrate visual, attentional, memory and physical changes, including glasses and swimming goggles with simulated visual impairments, eye chart, ankle weights, and various secondary (distraction) tasks.

Session 3: Alternative transport and mobility options

This session discusses the importance of maintaining mobility, through adoption of appropriate self-regulatory driving practices, reduction and cessation of driving. This session provides some strategies to plan ahead for driving cessation, particularly the use of alternative transport options.

Session 4: Other strategies to manage successful mobility and reduce risk

This session follows on from Session 3, providing further ways to maintain safe driving practices including driving patterns and practices, and ensuring comfort and safety in vehicles. This session provides details of vehicle safety features (crash protection), choice of vehicles and vehicle safety resources. It also discusses ways to adapt vehicles to increase comfort and therefore improve safety.

3.3 EVALUATIONS OF THE PROGRAM

In addition to the use of evidence-based research in developing the program, another important element was to undertake evaluations of its format, delivery, content,
acceptability and effectiveness in raising awareness of issues surrounding the safe mobility of older drivers and promoting adoption of safe driving practices.

Two separate evaluation sessions were conducted. The first was a small pilot aimed at assessing format and content and the second was a large evaluation of acceptability and effectiveness. The processes and outcomes of these sessions are described below.

3.3.1 Melbourne-based pilot study

The pilot was conducted at MUARC in March 2008 with a group of five older drivers aged 65 years and older (3 males, and 2 females). Participants were recruited from an existing MUARC database of those registered for participation in older driver research.

The main aim of this exercise was to assess the appropriateness of the format and content through feedback from older drivers. A short version of the program was delivered over a four hour session. Participants were invited to provide comment throughout the sessions and complete a short evaluation survey at the end of the day. In addition, this exercise provided good practice and rehearsal for instructors. Senior MUARC staff also attended the session and provided feedback to the team.

In general, the comments provided by the participants were very positive and encouraging. All participants indicated that they thought the information presented throughout the program was very informative, and that they enjoyed the activities. Four participants responded that the delivery and content of the program was very acceptable, while one participant responded ‘acceptable’ to this question. Constructive criticisms were i) difficulty reading slides. Solutions: increase the font on the slides; improve the room lighting to enhance visibility of slides; increase the contrast of letters on background of slide; and ii) difficulty hearing what presenters were saying. Solutions: Speak louder, face the listeners; presenters remain in close proximity to participants; select a room with good acoustics.

There were very few suggestions in response to questions related to improving the format or content of the program. Most participants provided favourable comments on the existing program and no changes were required. Some suggestions for improvement were components that were outside the scope of the program (e.g., a defensive driving component).

Other feedback was raised at a debriefing with all project team members in attendance at the pilot program session. Some suggested changes related to simplifying and clarifying explanations of statistics, particularly explaining trends in population changes and the ‘short distance bias’, and presentation style of some of the strategies to maintain safe driving practices.

Based on feedback from the pilot study, appropriate changes and revisions were made to the program content and structure, particularly increasing font size and improving colour contrast on the slides, and ensuring clear explanations were given regarding older population demographics and older driver crash and injury risk.

3.3.2 ACT-based pilot and evaluation study

A second, larger pilot study was conducted to assess the delivery, content, acceptability and effectiveness of the program in Canberra in May 2008.
Participants

A total of 39 participants aged between 63 and 87 years (21 males, 18 females) took part in the pilot/evaluation study. Participants were recruited with the assistance of the ACT Council on the Ageing (COTA). Five hundred information flyers were distributed during Seniors Week in the ACT at participating COTA venues. In addition, members and associates of COTA and affiliated organisations assisted with recruitment.

Procedure

Prior to attending the workshop, participants were sent a pre-workshop survey, and requested to complete it and bring it with them to the workshop session. On arrival at the workshop, participants were asked to complete another short pre-workshop survey prior to commencement of the program. All pre-workshop surveys were collected by instructors before sessions commenced. The pre-workshops surveys are provided in Appendix B.

Two one-day workshops were organised and participants were invited to choose which session they wished to attend. Twenty participants attended one session and 19 participants attended the other. Sessions were held from 9.30am to 3pm on two consecutive days during May 2008 at the Southern Cross Club, Woden, ACT.

At the conclusion of each workshop, post-workshop surveys were given to each participant to complete in their own time. Participants were requested to return their survey to MUARC within one week using a reply-paid envelope provided. The post-workshop survey is provided in Appendix C.

Results

Overall demographics, health and driving experiences

Of the thirty-nine drivers who participated in workshop sessions, thirty-two completed and returned the pre- and post-workshop evaluation surveys. Survey data from both workshops were combined. Therefore all data analyses are based on an overall sample size of thirty-two. Table 1 provides an overview of the demographics of the sample.

Table 1: Workshop participants’ demographic characteristics by gender

<table>
<thead>
<tr>
<th></th>
<th>Males (%)</th>
<th>Females (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-75 year olds</td>
<td>41.2</td>
<td>66.7</td>
<td>53.1</td>
</tr>
<tr>
<td>76-87 year olds</td>
<td>58.8</td>
<td>33.3</td>
<td>46.9</td>
</tr>
<tr>
<td><strong>Living Arrangements:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>11.8</td>
<td>46.7</td>
<td>28.1</td>
</tr>
<tr>
<td>Living with partner/spouse</td>
<td>88.2</td>
<td>46.7</td>
<td>68.8</td>
</tr>
<tr>
<td>Living with others (family/friends)</td>
<td>0</td>
<td>6.7</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Overall, there was an equal distribution between younger and older participants, and, while there was a tendency for male participants to be in the older age group and females in the younger age group, these differences were not significant (most likely because of the small sample size). In addition, the majority of participants (68.8%) lived with their partner or spouse. Further analysis revealed that there were gender differences in living...
arrangements, $\chi^2(2) = 6.6$, $p<0.05$. The majority of male participants reported that they lived with a partner or spouse. In comparison, of the females attending, responses were evenly distributed across living alone and living with a partner or spouse. This higher proportion of males living with a spouse/partner than females is reflected in the Australian population (Australian Bureau of Statistics, 2004).

Participants were asked some questions on their overall health. Figure 2 shows the proportions of male and female participants with reported selected health conditions. Cataracts were common among both male and female participants, with approximately 40 percent of each group reporting the presence of cataracts. Likewise, arthritis was a commonly-reported condition, with half of female participants and close to 40 percent of male participants reporting the presence of arthritis. Male participants were more likely to report heart conditions, diabetes and memory problems, while female participants were more likely to report muscle weakening and arthritis.

![Figure 2: Proportion of participants reporting selected health conditions](image)

Participants were also asked questions on their driving behaviour and patterns and use of other modes of transport. Table 2 shows responses to driving patterns by gender. Overall, almost half of all participants indicated that they drove substantial distances each week, between 101 and 200 km. A further 31 percent estimated that they drove between 51 and 100 km each week. An effect of gender was found: females were more likely to report driving shorter distances than male participants, $\chi^2(3) = 8.1$, $p<0.05$, with the majority driving between 51 and 100 km per week, and a substantial proportion (21%) driving less than 50 km per week.

**Table 2: Driving patterns by gender**

<table>
<thead>
<tr>
<th>Amount of driving per week (km):</th>
<th>Males (%)</th>
<th>Females (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50km</td>
<td>0</td>
<td>21.4</td>
<td>10.3</td>
</tr>
<tr>
<td>51-100km</td>
<td>20.0</td>
<td>42.8</td>
<td>31.0</td>
</tr>
<tr>
<td>101-200km</td>
<td>60.0</td>
<td>35.8</td>
<td>48.4</td>
</tr>
</tbody>
</table>
While males tended to report a higher frequency of driving, with the majority of them reporting driving at least once a day (88.4%), only 64.3 percent of females reported doing so. A higher proportion of female participants also report driving only two to three times a week, compared with male participants (35.7% vs 11.7%). These differences did not reach significance, however, \( \chi^2(2) = 2.53, p=0.28 \).

For the question asking participants to compare the amount of current driving to the previous 5 year period, no gender differences were found, \( \chi^2(2) = 5.32, p=0.07 \).

Participants were also asked to indicate the frequency of using different modes of transport over the last 12 months (Table 3). Not surprisingly, all participants indicated that they drove their own vehicle almost all of the time, and substantial proportions indicated that they rode as a passenger in their own or others’ vehicles. All forms of public transport (taxi, bus and community transport) were rarely used.

In general, responses were similar for male and female participants – both groups drove their own vehicle most of the time, and were frequently passengers in other vehicles. Interestingly, female participants were more likely to indicate that they rarely or never rode as a passenger in their own vehicle, compared with male participants. A higher proportion of female participants also indicated that they used the bus over the last 12 months, compared with male participants.

### Table 3: Use of modes of transport: frequency of use over the last 12 months by gender

| Mode of transport          | Males (%) |  | Females (%) |  |
|----------------------------|-----------|  |             |  |
|                            | Frequently or Sometimes | Rarely or Never | Frequently or Sometimes | Rarely or Never |
| Driven own vehicle         | 100.0     | 0.0  | 100.0       | 0.0  |
| Passenger in own vehicle   | 41.2      | 58.8 | 26.7        | 73.3 |
Passenger in other vehicle & 52.9 & 47.1 & 57.1 & 42.9 \\
Taxi & 12.5 & 87.5 & 7.1 & 92.9 \\
Bus & 25.0 & 75.0 & 35.7 & 64.3 \\
Community Transport & 6.3 & 93.7 & 0.0 & 100.0 \\
Motorised scooter & 0.0 & 100.0 & 0.0 & 100.0 \\
Bicycle & 0.0 & 100.0 & 0.0 & 100.0 \\

Effect of program on driving behaviours, awareness of functional abilities and knowledge of road safety issues

In order to examine the effectiveness of the program on improving awareness of road safety issues and driving behaviour, participants were asked a series of questions in both the pre-workshop and post-workshop surveys. First, participants were asked to indicate whether they avoided some hazardous driving situations or not using a 5-point scale (always, usually, sometimes, rarely or never). Of most interest here were responses where participants always avoided driving situations, and these are presented in Figure 3.

Overall, small proportions (3-17%) of participants reported always avoiding most of the listed driving situations. The most commonly avoided driving situations were changing lanes, driving at night (especially when wet), and driving in busy traffic. While proportions of responses were low, there were some interesting and mixed results in reported avoidance after attending the workshop, compared with before. For example, post-workshop responses showed that more participants indicated that they always avoided driving at night, in the rain, on freeways, and driving through intersections without traffic light and making right-hand turns without traffic lights compared with reported pre-workshop behaviours. However, there were also fewer participants who indicated that they always avoided changing lanes and driving in busy traffic after attending the workshop.

Participants were asked to rate their driving abilities to other drivers, and to their driving 20 years ago. In general, prior to attending the workshop, the majority of participants felt that their driving abilities were equal to i) most drivers their own age (61.3%), ii) most other drivers aged 30-50 years (64.5%), and iii) how they drove 20 years ago (54.8%). These ratings did not change after attending the workshop.

Figure 3: Avoidance of driving situations by survey session
In addition, participants were asked to rate various functional abilities for safe driving. Table 4 summarises these ratings.

**Table 4: Ratings of abilities for safe driving by survey session**

<table>
<thead>
<tr>
<th>Ability for safe driving</th>
<th>Pre-workshop (%)</th>
<th>Post-workshop (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision for safe driving during the day:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good to excellent</td>
<td>87.5</td>
<td>78.1</td>
</tr>
<tr>
<td>Fair to good</td>
<td>12.5</td>
<td>21.9</td>
</tr>
<tr>
<td>Very poor to poor</td>
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<tr>
<td>Very good to excellent</td>
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Overall, participants rated their abilities for safe driving highly, many reporting very good to excellent abilities and this was particularly so for vision for safe driving through the
night. For other abilities, a substantial proportion also rated their abilities as fair to good (e.g., vision for safe driving at night, ability to respond quickly for safe driving). No significant changes were noted for rating responses between pre-workshop responses and post-workshop. There was some suggestion, however, that ratings for safe driving during the day decreased, with fewer reporting very good to excellent abilities and more reporting fair to good abilities after attending the workshop.

One of the major aims of the program was to increase awareness of older driver crash and injury risk. To address this a series of statements were posed and participants were asked to indicate whether they believed them to be true or false. Figures 4 to 8 show responses to each of these statements.

With regard to awareness of injury crashes amongst older drivers (Figure 4), only 42 percent of participants agreed with this statement prior to attending the workshop, and this proportion increased to 58 percent. This increase, however, was not significant, $\chi^2(1) = 1.59$, $p=0.21$.

![Figure 4: Responses to statement ‘People aged > 65 years have more injury crashes compared to those aged 40-65 years’]

The majority of participants agreed, both prior to and after attending the workshop, with statements regarding older drivers adjusting their driving (Figure 5), that they drive at safer speeds than younger drivers (Figure 7), and that safety features of vehicles are important (Figure 8). There were no significant changes in participants’ beliefs as to whether these statements were true or false as a result of attending the workshop, $\chi^2(1) = 0.38$, $p=0.54$, $\chi^2(1) = 0.74$, $p=0.39$, and $\chi^2(1) = 0.01$, $p=0.97$, respectively.

With regard to the statement ‘one of the most difficult manoeuvres for older drivers is making right hand turns across traffic’ (Figure 6), 58 percent of participants believed this to be true prior to attending the workshop. This proportion increased to 79 percent after attending the workshop. This difference approached significance, $\chi^2(1) = 3.11$, $p=0.08$. 
**Figure 5:** Responses to statement ‘Most older drivers tend to adjust their driving to allow for the effects of ageing’

**Figure 6:** Responses to statement ‘One of the most difficult manoeuvres for older drivers is making right hand turns across traffic.’
Figure 7: Responses to statement ‘Older drivers usually drive at safer speeds compared to younger drivers’

Figure 8: Responses to statement ‘Safety features of a car are a very important factor in my protection as a driver or passenger’

Last, participants were asked to report the extent to which they have considered ways in which their abilities affect their driving (Figure 9).
Prior to the workshop, responses were relatively evenly distributed across the categories. Approximately 32 percent reported that they considered the effect of abilities on driving a lot, 29 percent a little, and 19 percent somewhat and not at all, each. In contrast, after attending the workshop, participants were more likely to have considered these issues, $\chi^2(3) = 7.96$, $p<0.05$. Fifty-five percent of participants considered the effect of abilities on driving a lot, and 32 percent considered this to some extent.

Acceptability of the program

Participants were asked a series of questions regarding the program. We were interested to gain feedback from participants on their overall thoughts on the program, their likes and dislikes of each session, and difficulties they experienced with any of the session components, as well as suggestions for improvement.

First, participants were asked to indicate overall how informative they thought the program was. Encouragingly, 55 percent of participants found the workshop to be very informative. Twenty-nine percent reported the workshop to be moderately informative, while 16 percent felt that it was somewhat informative. There were no participants who thought the workshop was not informative.

Next, participants were asked to rate ease of understanding (Table 5) and how informative (Table 6) they thought the workshop sessions and components were.

Table 5: Ratings of ease of understanding overall and for each session (presentation and group discussion components).
Generally, the results were positive, with the majority of participants rating the workshop and sessions (both in terms of presentation and group discussion) as very easy or easy to understand. Session 2 group discussion was more likely to be rated as less easy to understand than other sessions, with approximately 18 percent of participants rating it as difficult or ambivalent regarding ease of understanding. This was not surprising, as session 2 focussed on changes functional performance and involved a substantial amount of participation in activities to demonstrate the effect of age-related limitations on driving behaviour and performance.

The majority of participants (two thirds to three quarters) also rated the level of information as moderately to very informative, while up to one third also indicated the level of information was somewhat informative. Overall, around 10 percent reported that they found the group discussions not at all informative; this was particularly so for session 4.

Table 6: Ratings of level of information overall and for each session (presentation and group discussion components).

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<th></th>
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<td>54.5</td>
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Participants were asked to list or describe any additional information that they would have liked to have been included in the workshop. While many participants did not respond to this question (62.5%), of those who did provide a response, there were suggestions of providing more detailed information on road rules (e.g., right-of-way at roundabouts), the addition of some form of driving test or training session, and added hints and strategies for those who drive long distances to overcome the effects of fatigue. Some examples of responses to this question were:

‘Please more information on organisations that provide aged driver training and testing.’

‘A clear statement/diagram of who has right of way at roundabouts.’

A series of questions were asked regarding the use of computers in some tasks, especially those in Session 2 (demonstrating age-related limitations), as the level of computer use amongst cohorts of older adults and implications of use and usefulness of computer-based exercises in these workshops was one of the concerns raised during the early development of the program.

First, we asked participants to report on their familiarity with using computers, and the majority (62.5%) said that they were at least familiar or very familiar with using computers. Only 3 percent reported that they had never used a computer before. Furthermore, when asked to indicate whether they had difficulties using the computers in the workshop, 77.4 percent reported that they had no difficulties. Interestingly, however, 60.7 percent also reported that they thought the use of computers didn’t add anything to or improve the workshops.

In addition, participants were asked to describe or list aspects of the workshop that they liked or disliked. Of the comments listed under ‘likes’ of the workshop, comments were very positive and several themes emerged on further analysis of these data. Many of the
responses centred around the presentations and presentation style, indicating general satisfaction with the easy manner, helpfulness and non-judgmental style of the presenters.

Many of the positive comments also centred around the design of the workshop and ability of presenters to engage all participants in discussions. The fact that the sessions gave time, encouraged and promoted group participation, discussion, interaction and exchange of ideas was appreciated by many of the participants.

Some examples of comments regarding presentation style and group participation include:

‘Informative, relaxed, good outline, opportunities for audience to participate.’

‘The presentation was conducted in a calm manner, and the presenters knew their subject. The course leaders were able to draw maximum interest from the class members.’

‘Welcoming, informative atmosphere, comfortable venue, enthusiasm of presenters for their topics, high degree of relevance of the material presented, good opportunities for group discussion.’

Nine reported ‘dislikes’ relating to the workshops were reported. These comments addressed issues including i) wanting more information and explanation, ii) lack of time for everyone to do activities, iii) and the need to curtail outspoken participants and those who monopolised discussions. In addition, one participant reported not liking the computer tasks, and another reported the information presented was a repetition of common knowledge. Some examples of dislikes (and suggestions for improvement) include:

‘For older people your voices could have been a little louder and on occasions speak slower.’

‘Please keep a check on those attending who monopolise the discussion.’

Finally, participants were asked to provide suggestions for improvement to the workshop. Approximately half of the group indicated that the workshop could be improved, and the common themes emerging from this response were more time required for all sessions but particularly activities, presentation style (to ensure speakers can be heard by all participants), and provision of handouts to digest information after the workshop. Some suggestions for improvement included:

‘I needed a bit more time to digest each section of the information. Handouts of the material on the overheads?’

‘Arrangement of the room, to have speakers as close as possible to ALL participants. Talking more slowly, clearly, loudly with mouth up facing the audience....’

‘More client participation/input. Let seniors ADD their ideas, experiences, problems met and solved.’

‘Please remember, this is for old people, many of whom are not experienced with the exercises and use of computers.’
3.3 SUMMARY

The ‘Seniors Driving Longer, Smarter, Safer’ program was developed taking into account our understanding of the issues surrounding the safe mobility of older road users, previous literature and international ‘best-practice’ in road safety education programs, general international ‘best-practice’ in adult education strategies, and feedback from groups of older road users.

The content of the program was designed to address four major areas identified in the literature as important areas for the safe mobility of older road users, including a general awareness of crash and injury risk, the impact of age-related functional changes on driving ability and safety, use of alternative transport options, and strategies to maintain safe driving. The program is delivered in four sessions, each addressing the four issues above in detail. Each session is designed to provide evidence-based information, and engage participants in group discussion and activities.

International ‘best-practice’ in adult education and teaching strategies was identified and used in the format of presentation style and design of activities. During each session, presentations are clear and designed to inform, presenters are instructed to speak clearly and slowly, provide ample time for participants to take in the information presented, be respectful of the experiences and knowledge of the group, and encourage group participation. The program instructors manual describes adult teaching methods and provides rationale for adopting these strategies.

Two trial workshops were conducted and evaluated to determine the effectiveness of the program in changing/improving overall knowledge of safe mobility and adoption of safe driving practices was assessed. The most encouraging finding was the significant change, as a result of the program, in the extent to which participants had considered ways in which their abilities affected their driving, with more participants indicating that they thought a lot about these issues after attending the program. In addition, there was some suggestion that attendance at the program resulted in some changed attitudes to important road safety messages. More research is needed with a larger sample to explore changes in self-regulatory behaviours such as avoidance of difficult driving situations (such as driving at night, in the rain, on freeways, and driving through intersections without traffic lights).

In terms of acceptability of the program, overall findings and comments received from participants were positive and encouraging. It seemed that the majority of respondents found the program worthwhile, very informative, educational and useful. One respondent added that it was one of the most useful workshops that he had attended for some time. It dealt with issues that he had not thought about but are going to become very important.

Participants reported that the workshop information on declining abilities was interesting. The use tasks and props was well received and thought to be effective in raising awareness of the issues surrounding older drivers. In addition, respondents found the case study tasks worthwhile and suggested that more time could be spent on providing more practical examples to work on. While a number of concerns were raised regarding the cost of designing roads in this way, the workshop stimulated awareness of older driver requirements.

As a result of these findings and comments, some minor revisions were made to the final workshop package. These revisions were to emphasise the need for presenters to speak clearly and slowly and ensure that maximum participation from the group is achieved,
some graphics on the slides were changed to ensure the message was clear. With regard to timing of sessions and activities, the pilot workshops were run over a shorter timeframe than that designed for the actual program. The program is designed to be conducted over two days. This provides substantially more time for activities, and group discussion/input from participants than was available in the pilot sessions.
4 CONCLUSIONS AND RECOMMENDATIONS

This final section brings together the findings of the study, from the international literature review, the development of the program and the evaluation to summarise and provide some recommendations for further research and implementation of the program.

While safe travel remains an essential goal for any society, recognition of the benefits of continued mobility and, conversely, serious consequences of loss of mobility must also be considered. Mobility is critical to carry out life’s activities, and to maintain independence, a good psychological outlook and well-being. In contrast, poor mobility places a substantial burden on the individual, family, community and society. Given that many older drivers will, at some point, need to consider driving cessation, there is a real need to ensure that this transition is as smooth as possible and that means raising the awareness of the benefits of planning ahead for retiring from driving and providing new and different kinds of transport options and mobility services that are viable, affordable, accessible, safe and co-ordinated.

Education and training to improve the driving experiences and practices of older drivers is central to current international thinking about this group’s safe mobility and there is increasing international recognition of the benefits of programs aimed to maintain safe driving as long as possible and to assist a smooth transition from driver to non-driver. It is claimed, for instance, that if older people are able to adopt safer driving practices, then this will have a protective effect on crash risk and subsequently there would be less need for them to have to submit to periodic licence testing. Furthermore, a well-managed process from driver to non-driver will result in overall improved health of the older population through maintenance of mobility, independence, self-esteem and quality of life. This would represent a substantial community saving.

The overall aim of the project, therefore, was to develop an informative, useful and effective training program for older drivers that will raise the awareness of older driver safe mobility, and promote the use of strategies to maintain safe driving practices for as long as possible and planning for mobility options beyond the car.

A number of tasks were undertaken in the development of this program including:

- A review of the literature, including identification of other previous or existing educational and training programs nationally and internationally, and identification of key ‘best-practice’ initiatives;

- Development of a training program for seniors using current literature on issues pertaining to older driver safe mobility and incorporating current ‘best-practice’ in adult education; and,

- Evaluation of the program to assess its effectiveness in improving knowledge, attitudes to and adoption of safe driving practices amongst older adults, and acceptability of the program in terms of presentation style, delivery, content and use of computer-based activities.

The final product is a ‘ready-to-deliver’ program package. The resource is designed for local governments, non-government organisations, community groups, practitioners and volunteers who either provide services to or work with older populations. The package provides the materials for interested organisations to run workshops for seniors whom they
work with and includes an instructor’s manual, powerpoint presentation, materials for activities and a brochure for group sessions. The instructors manual sets out clearly the set up of classes and activities, strategies on effective teaching amongst older adults, and step-by-step messages to be delivered for each powerpoint slide as well as detailed procedures for activities.

4.1 RECOMMENDATIONS

There are a number of recommendations for further research, promotion and distribution of the package as a result of this work. These are described briefly below:

4.1.1 Recommendations for further research

While the current program addresses important areas of older driver safe mobility, there are opportunities to enhance and complement the existing program.

- A major component of the current study was to evaluate the program amongst a group of older drivers with respect to its effectiveness in improving knowledge of crash and injury statistics, the effect of age-related functional changes on driving ability, and knowledge of safe driving practices and some encouraging results were found. However, a small and non-representative sample was used for this exercise. A larger-scale implementation and evaluation trial would be of great value to assess its effectiveness on a number of variables. The preferred approach is a large randomised control trial of older drivers to determine the benefits of the program to the community. It will be important to demonstrate in a scientifically rigorous manner that there are strong safety benefits associated so that the program can be promoted with a high level of confidence.

- It is clear that there are a number of sub-groups within the overall cohort of older adults and each has their particular needs and safety/mobility issues. Indeed, the first of the baby-boomers are reaching 65 year of age and may well have very different driving experiences, and safety and mobility issues compared with the oldest old group. Therefore we need to understand these potential differences in order to design appropriate and effective educational and training programs to accommodate potential cohort differences.

- Current baby-boomers are also children of elderly parents, with many of them concerned about their parents’ safe driving and encouraging them to reduce or stop driving. This is a difficult transition for all family members without appropriate awareness of the issues, and planning ahead. While children of older drivers can play an important role in assisting a smooth transition from driver to non-driver, there are limited resources to assist them in this role. It is recommended that complementary educational resources to the current program should be developed. These complementary resources could be aimed at providing children of older adults nearing the end of their driving life with evidence-based information and strategies to help manage this process.

4.1.2 Recommendations for further distribution and promotion

There are good opportunities for widespread use of the package in the community, however, a number of steps are required for this to occur, particularly to ensure that the package is delivered in an appropriate manner.
• It is envisaged that the resource can be implemented by relevant community groups and organisations including motoring clubs with oversight of the resource by a coordinating body to ensure quality, consistency and relevance of the product and its delivery.

• While the package is designed for immediate use by organisations and community groups to deliver to older drivers, it is important that a consistent message is conveyed. It would be of overall benefit for any organisation or group interested in promoting and presenting program workshops to undertake training sessions. It is therefore recommended that MUARC develop a ‘train-the-trainers’ course to ensure the integrity of the program, that potential presenters understand the importance of delivery style, the information being conveyed to participants is current and still relevant, and to provide them with training on activity procedures.

• It is important that potential users of the program are aware of its existence and have the opportunity to request training sessions for them to take the program to their communities. This will require a media campaign, perhaps through development and promotion of a series of presentations and flyers targeting government and non-government organisations and community groups.

4.2 CONCLUSIONS

The ‘Seniors Driving Longer, Smarter, Safer’ program addresses an important component of the Safe System approach, i.e., ensuring that older adults remain safe road users.

The program was developed to address the issues surrounding self-regulation, awareness of changing abilities and how they relate to the driving task, and to provide drivers with strategies to keep them safe and mobile. These strategies include making appropriate changes to driving behaviours and patterns, as well as planning ahead for the transition from driver to non-driver. A small evaluation of the program demonstrated its effectiveness in raising the awareness of the issues surrounding older driver crash and injury risk, and the factors that may increase this risk, as well as adoption of some safe driving practices. Furthermore, the evaluation showed high acceptability of the program amongst groups of older adults.

It is an effective training program aimed to inform drivers about steps they can take to ensure their safety and others while they are driving. The package produced is a ‘ready-to-use’ resource (along with liaison with MUARC developers) for organisations and community groups working with older populations and includes all materials, instructions, activities and brochures for implementation.
References

Augenstein, J. (2001). Differences in clinical response between the young and the elderly. *Proceedings of the Aging and Driving Symposium, Association for the Advancement of Automotive Medicine, Des Plaines, IL.*


