



MONASH University

Accident Research Centre

OLDER WOMEN AND DRIVING: A SURVEY

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Older Women Drivers: A Survey

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Abstract:

Older female drivers are over-represented in serious injury crashes compared to older men and younger women, and this will most likely increase in the years ahead. There are issues that are specific to the safe mobility of older female drivers including driver experience, confidence, exposure, trauma consequences, and mobility consequences of premature driving cessation. The aim of this study was to investigate the safety and transportation issues of older women drivers in the ACT, specifically to identify age and gender effects on crash rates and crash types in the ACT, conduct a survey of older female drivers and former drivers to identify the issues of concern to older women and to develop the contents of an educational resource addressing the issues and problems for older women drivers in the ACT.

The findings from the crash data analyses revealed that, while older car occupants are at relatively lower risk of crash involvement and injury risk than younger car occupants, crash rates adjusted for population and licence distribution show high rates of fatalities for older male drivers and high rates of serious injury crashes for older female drivers.

The survey of older female drivers in the ACT revealed a number of associations between driver characteristics and crash involvement, driving distance and continued years of driving. Older women with poorer health status, who were the principal driver but lacked up-to-date driving experience, who reported being less confident and less positive about driving, and who reported problems driving were more likely to have been involved in a crash than younger, healthier women who did less of the driving and were confident and positive about driving. In addition, older women with health problems, who experienced problems with driving situations, did not enjoy driving and had been involved in a crash were least likely to have expectations of longer-term continuation of driving. While current drivers expressed negative feelings about driving cessation, former drivers were generally more positive about their decision and stopped driving because of availability of another driver, discomfort, lack of confidence and loss of enjoyment in driving. Approximately one-third of the sample felt they stopped driving too early and the presence of another driver affected this decision.

This research has provided information for the development of road safety initiatives targeting the specific issues for older female driver groups, particularly educational resources presenting information on maintaining safe mobility. Recommendations for such a resource include: ways to reduce crash risk such as recognising the signs of reduced driving ability and adapting driving to capabilities, maintenance of up-to-date driving experience, and gaining confidence in driving; ways to successfully reduce and stop driving at the right time; and ways to maintain mobility after driving cessation including exploration of different lifestyle choices and alternative transport options. The findings also highlighted the need for further research to i) examine the role of functional ability in crash risk amongst older female drivers in more depth, ii) strengthen the current findings by comparing the experiences of older female drivers in other jurisdictions, comparing the experiences of older male drivers, and expanding the sample of former drivers to investigate fully the mobility consequences of stopping driving.

It is expected that this research will play a major role in improving the driving experiences, safety and mobility of older female drivers not only for the current generation of older road users, but also future cohorts of older female drivers.

Key Words:

Older driver, Safety, Gender, Crash risk, Countermeasure, Education

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EXECUTIVE SUMMARY

Introduction

Driving is of fundamental importance for older people, however, older drivers are involved in significantly more serious injury and fatal crashes per distance travelled than younger drivers. Older female drivers, in particular, are over-represented in serious injury crashes compared to older men and younger women. Given the predictions that older females will constitute a larger part of the older driver population in the near future and contribute substantially to the increased rate of fatal and serious injury crashes, an understanding of the particular needs and experiences of this group is required in order to develop measures to ensure their continued safe mobility.

While the causes of older driver crashes are complex, their over-representation in fatal and serious injury crashes can be partly explained by a range of factors. Contributory factors include health factors, functional performance and physical vulnerability, travel patterns and exposure, lack of driving experience and confidence, and mobility consequences of premature driving cessation. Moreover, it is generally acknowledged that there are issues specific to older female drivers that need to be taken into account when assessing the relative safety of older men and women.

Safe and efficient driving requires the adequate functioning of a range of abilities and good health and it is generally agreed that some older drivers with particular limitations are at increased risk of crash involvement. Even though older women have a longer life expectancy than men, they have a greater prevalence of illnesses, use health services more, are more likely to suffer a disability and experience problems carrying out activities of daily living, and have greater susceptibility to injury and poorer capacity to recover from an injury than older men.

The travel patterns of men and women differ. Older women, like older men, continue to depend heavily on the private car for transportation and mobility needs and this is increasing. However, it seems that women generally drive fewer kilometres, drive shorter distances, drive in different traffic situations and drive more conservatively than men. Further, fewer women are licensed, compared to men, particularly as age increases, with only about 20 percent of women aged 85 years and older holding a valid drivers licence.

Major factors identified in the literature are lack of up-to-date driving experience and associated lack of confidence in driving. Compared to men, older women drivers report more difficulties, experience more stress in difficult traffic situations and have higher overall stress levels while driving. Among today's cohort of older couples, the male partner is generally the principal driver when couples drive together. However, if and when the male partner is unable to drive, it is often left to the female partner to take on the principal driver role. This may be a stressful experience for many older women and may lead to an increase in their crash risk.

Another important factor for the continued mobility of older women is the problem of premature cessation from driving. Women's decisions to give up driving seem to be influenced by different factors than those of men. While men generally stop driving for health-related factors, women stop driving for other reasons such as avoidance of stressful driving, a general lack of driving enjoyment, and availability of another driver (usually the male partner).

Analysis of ACT crash data

The analysis of reported crashes in the ACT between 1990 and 2002 revealed that, in terms of raw numbers, older car occupants are at relatively lower risk of crash involvement than younger car occupants, but that older females occupants are at greater risk than older males of being killed in a crash. More importantly, when adjusted for population and licence holder distribution, high rates of fatalities for older drivers compared to younger drivers were found, particularly for older male drivers. Older female drivers were over-represented in serious injury outcomes.

The survey of current and former older women drivers

The broad aim of this study was to investigate the safety and associated transportation issues of older women drivers in the ACT, and specifically to examine issues of concern such as the effect of lack of up-to-date driving experience and lack of confidence on crash risk, and examine the mobility needs of older women.

The findings revealed that the sample of drivers was a fairly active and independent group, driving frequently and substantial distances each week and often driving alone. However, as expected, the amount and frequency of travelling decreased as age increased, while the likelihood of driving alone increased as age increased. Former drivers, too, were a fairly active group, albeit considerably less mobile than current drivers.

A number of associations were observed between driver characteristics and crash involvement, driving distance and continued years of driving. Older women with poorer health status, who were the principal driver but lacked up-to-date driving experience, who reported being less confident and less positive about driving, and who reported difficulties with driving were more likely to have been involved in a crash than younger, healthier women who did less of the driving and were confident and positive about driving. In addition, older women with health problems, who experienced difficulties with driving situations, did not enjoy driving and had been involved in a crash were least likely to have expectations of longer-term continuation of driving.

While current drivers expressed negative feelings about driving cessation, former drivers were generally more positive about their decision and stopped driving because of availability of another driver, discomfort, lack of confidence and loss of enjoyment in driving. Approximately one-third of the sample felt they stopped driving too early and the presence of another driver affected this decision.

Summary and recommendations

This study highlighted the need for a comprehensive strategy to meet and support the mobility and safety needs of older women drivers in the future, one which includes education initiatives, improved vehicle design and countermeasures to ensure a safe and comfortable road environment. Programs aimed to raise the awareness of safety and promote the adoption of safe behaviour among the older community will be an essential component of the strategy.

The findings from this research translate to the need for a well-structured educational handbook, providing information on how to maintain safe mobility for older women. It is recommended that an educational resource should contain the following information:

- **Crash and injury risk:** General information about the increased risk of crash and injury with increasing age.
- **The benefits of safe driving:** Information on the mobility benefits of driving safely for as long as possible.
- **Risk factors:** Information of what places older women at higher risk of crash involvement and injury outcomes including health and age-related functional performance factors, physical frailty, consequences of lack of up-to-date driving experience and lack of confidence, and the avoidance of difficult driving situations.
- **Safe practices:** Information on how to keep driving safely for as long as possible such as recognising the signs that driving skills are changing, and ways to maintain driving skills and confidence.
- **Reduction and cessation of driving:** Information on the benefits and disbenefits of driving reduction and cessation including adoption of safe driving practices and successfully retiring from driving at the right time.
- **Maintaining mobility:** information on ways to maintain satisfactory mobility without the car such as lifestyle choices and exploring alternative transport options.

Recommendations for further research include:

- Extension of the survey to include a sample from at least one other jurisdiction to strengthen the findings and recommended countermeasures.
- Extension of the survey to include a sample of male drivers in order to investigate gender comparisons.
- Detailed investigation of travel patterns and driving experiences of older drivers by use of travel diaries.
- Comprehensive examination of the contributory factors to crash risk of older female drivers. Two methods may be used to investigate this issue in detail including: i) follow-up statistical analyses of factors associated with crash involvement using existing data, and ii) a case-control study of crash-involved and non-crash-involved participants involving face-to-face interviews and assessments of functional performance to gain an understanding of the functional limitations that may heighten crash risk.

OLDER WOMEN DRIVERS: A SURVEY

1 THE ISSUES SURROUNDING OLDER WOMEN DRIVERS

Driving is thought to be of fundamental importance for older people and there is growing recognition of the need to improve the safe mobility of older road users. Given the predictions that older females will constitute a larger part of the older driver population in the near future, it is timely to understand the particular needs and experiences of this group in order to develop measures to ensure their continued safe mobility.

The relevance of gender to road safety has long been recognised, however, it appears that the issue of female drivers is an emerging concern for road safety. In particular, it appears that the fatality and injury rate of older female drivers is increasing and is likely to increase in the years ahead. One of the key issues highlighted in recent research on older drivers is the need to examine in detail the specific issues surrounding the mobility and safety of older women while using the transport system (Oxley & Fildes, 2000; OECD, 2001; Sirén, Hakamies-Blomqvist & Lindeman, in press).

The NRMA-ACT Road Safety Trust recognises the need to address the crash risk of these vulnerable road users and commissioned the Monash University Accident Research Centre to undertake an investigation of the safety and associated transportation issues of older women drivers in the ACT. Specific project tasks included:

- Review of the literature to outline and understand the problems confronting older drivers, particularly older female drivers;
- Investigation of crash rates and crash types of older drivers in the ACT and elsewhere to identify the differences in crash rates and types between older male and female drivers in the ACT;
- A survey of a representative sample of older women drivers and former drivers to identify the contributing factors to differences in driving and travel patterns, examine issues of concern such as the effect of lack of up-to-date experience and confidence on crash and injury risk, and examine the transportation and mobility needs of older women;
- Development of the contents of an educational resource addressing the issues and problems for older women drivers in the ACT.

This report outlines the issues surrounding the mobility and safety of older women, describes gender effects on crash rates, and describes the results of a survey on the transportation experiences of older women drivers and former drivers in the ACT. It then summarises the findings from the survey and international literature to formulate some recommendations for an educational resource to raise the awareness of issues amongst older women and recommendations for further research and development.

1.1 CRASH RISK

Absolute numbers of older driver crashes are relatively small compared with other age groups such as young drivers aged 18 to 25 years. Crashes involving older drivers constitute approximately 13 percent of fatal crashes and around 10 percent of serious injury crashes in Australia. By comparison, younger drivers aged 17 to 24 years account for around 29 percent of fatal and 32 percent of serious injury crashes (Australia Transport Safety Bureau [ATSB], 2001). Similarly, in New Zealand in 1998, drivers aged 65 years and older accounted for 16 percent of the total number of fatalities: in contrast, younger drivers aged 15 to 24 years accounted for 28 percent of the total number of fatalities (Fildes, Pronk, Langford, Hull, Frith & Anderson, 2000). International figures show similar trends.

The overall number of older driver crashes, however, obscures the magnitude of the older driver problem. Notwithstanding the relatively small absolute numbers of older driver crashes compared with younger driver crashes, there are relatively fewer older drivers, their total annual distance travelled tends to be less and they are more frail than younger drivers. Thus, when crash statistics are adjusted to take account of any of these factors, the safety of older drivers is clearly of concern. Australasian and international data show that they are involved in significantly more serious injury and fatal crashes per distance travelled than younger drivers (Evans, 1991; Fildes, Corben, Kent, Oxley, Le, & Ryan, 1994, National Highway Traffic Safety Administration [NHTSA], 1999; Organisation for Economic Co-operation and Development [OECD], 2001). Figure 1 shows the number of serious injury crashes per billion kilometres travelled by age group for drivers with and without adjustment for differences in physical vulnerability.

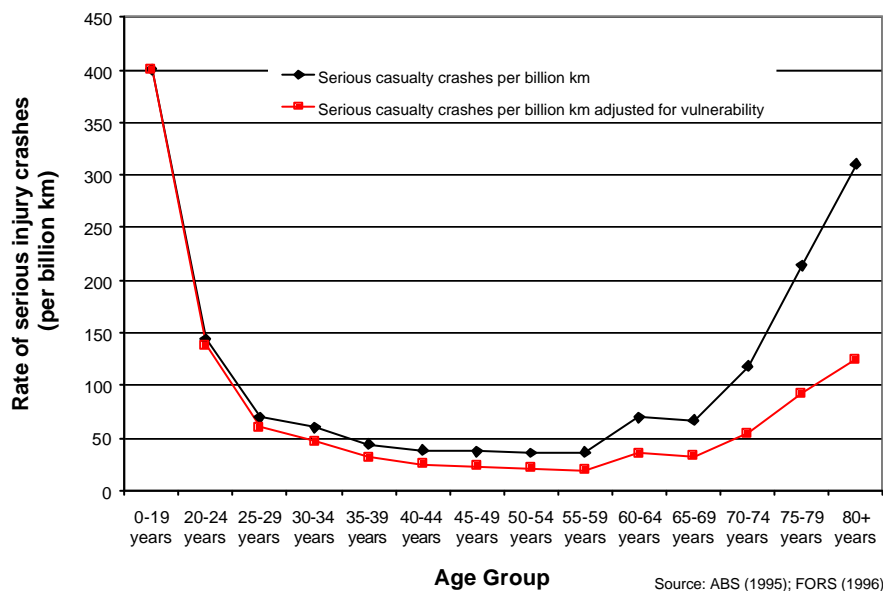


Figure 1: Involvement in serious injury crashes by age adjusting for exposure and vulnerability, Australia, 1996.

These data indicate that both younger and older drivers have high levels of serious injury crash involvement per billion kilometre driven compared to other age groups. After controlling for differences in vulnerability (older people are more easily injured by a given physical insult than younger people), older drivers aged 70 years and older, have a higher

serious injury crash risk than younger drivers with the exception of the youngest driver age group (under 25 years).

There are noted gender differences in crash statistics. While male drivers have tended to be over-represented in road crash fatalities, it appears that the issue of female drivers is an emerging concern for road safety. Australian studies reported that 45 years ago, virtually all drivers killed were male, however, the proportion of female driver fatalities rose to 13 percent in 1970 and in the early nineties, females accounted for between 22 and 27 percent of all deaths on Australia's roads (Ginpil & Attewell, 1994). In a more recent study, Attewell (1998) reported that the number of female drivers killed and hospitalised was increasing in the mid- to late- nineties, despite an overall decrease in the national road toll.

Figure 2 shows hospitalisation and fatality rates for Australian drivers in 1996 as a function of distance travelled by age and gender. Fatality rates for younger women drivers are lower than for males of similar ages, however, rates for older women drivers are similar to those of older men. Hospitalisation rates, however, are higher for older women drivers compared to similar aged male drivers. This may suggest that older women are involved in less severe or different crashes than men and might reflect differences in driving patterns (e.g., places driven, lower speed, more conservative driving).

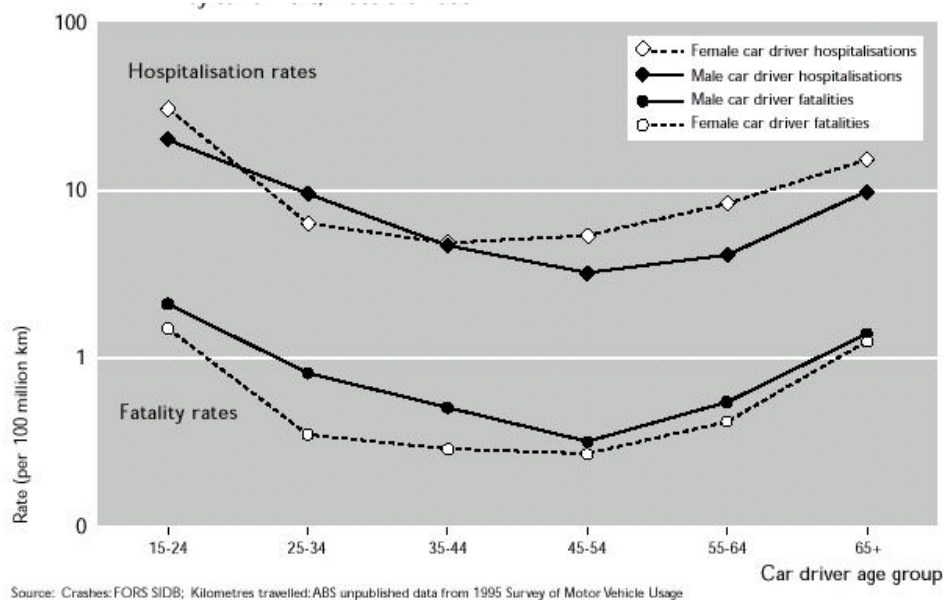


Figure 2: Fatality and hospitalisation rates as a function of distance travelled by age and gender, 1996.

Anderson, Adena and Montesin (1993) reported that the rate of fatalities per 100,000 population increased for women drivers between 1970 and 1990, but decreased for men over the same period, even though women tend to drive fewer kilometres than men. This increase was only evident for the youngest (under 30 years) and the oldest (over 70 years) women drivers. The ATSB, formerly known as the Federal Office of Road Safety, (1996) also noted that female drivers were at greater risk of being seriously injured in a crash than male drivers and argued that if the amount of travel by female drivers continues to increase, the number of female drivers killed or seriously injured will also continue to rise. Similarly, a more recent study in New Zealand found that the rate of fatal and serious

injury crashes involving female drivers aged over 75 years per kilometres driven, was substantially greater than for male drivers in the same age group (LTSA, 2000).

Using travel data from the 1995 US Nationwide Personal Transportation Survey (NPTS), Massie, Campbell and Williams (1995) examined crash involvement rates per vehicle mile of travel by driver age and gender in the US. They found that both younger and older drivers had elevated fatality rates compared to middle-aged drivers (11.5 and 9.2 involvements per 100 million vehicle-miles travelled, respectively). Further comparisons with all drivers revealed that, based on miles driven, teenage drivers (aged 16 to 19 years) had 3.0 times the risk and older drivers (aged 75 years and over) had 3.8 times the risk of being in a fatal crash compared with all drivers. The highest injury involvement rate occurred among the youngest drivers with those aged 16 to 19 years having 3.3 times the risk of involvement in injury crashes compared with drivers overall, while drivers aged 75 years and older having 2.0 times the relative risk of involvement. This study also showed that men had a higher rate of fatal involvement than women per mile driven. Male drivers experienced 3.5 fatal involvement per 100 million vehicle-miles travelled, while women experienced 2.2 fatal involvements. However, women had a higher rate of involvement in injury crashes than men (2.3 injury involvements compared with 1.8). Moreover, older women showed elevated rates of fatal involvement rates compared with younger women with the oldest women (aged 75 years and older) having over twice the fatal involvement rate of the youngest women.

More recent US data showed a similar over-representation. In their comparison of crashes involving older drivers in Maine, Finison and Dubrow (2002) found that the risk of hospitalisation or death to a crash-involved older driver was 1.7 times that of middle-aged drivers. Of this group, older female drivers were 1.6 times more likely to be hospitalised or die during a crash than were older male drivers.

Li, Baker, Langlois and Kelen (1996) found that, when crash rates are adjusted for kilometres driven, older female drivers exhibited nearly twice the crash involvement rate of older male drivers. Hakamies-Blomqvist (1998) pointed out, however, that these estimates may be somewhat inflated. She argued that crash rate per distance driven is a biased measure and puts older women drivers at a double disadvantage since both age and female gender are related to decreasing yearly mileage and risk estimates for low-mileage groups are inflated in comparisons using crashes per distance as a measure of risk. This issue requires more investigation. Nevertheless, it appears that older female drivers are over-represented in serious injury crashes compared to older men and younger women, and that there is some suggestion that their over-involvement in fatal and serious injury crashes will increase in the years ahead.

1.1.2 The ageing population and future crash risk

The older driver population in the future will most probably differ from older drivers of today. Not only will there be more older drivers on the road in the next 20 years or so, but there will be more older women using the road transport system.

Most Western societies, including Australia and New Zealand, predict substantial changes in the proportion of older persons in the population in the foreseeable future. The so-called 'baby-boomers' or post-war generation is ageing and lower fertility rates have reduced the proportion of those in the current younger generation. Thus, significant increases in the aged population have occurred, and will continue to occur. Figure 3 shows current and predicted proportions of older persons in the Australian population.

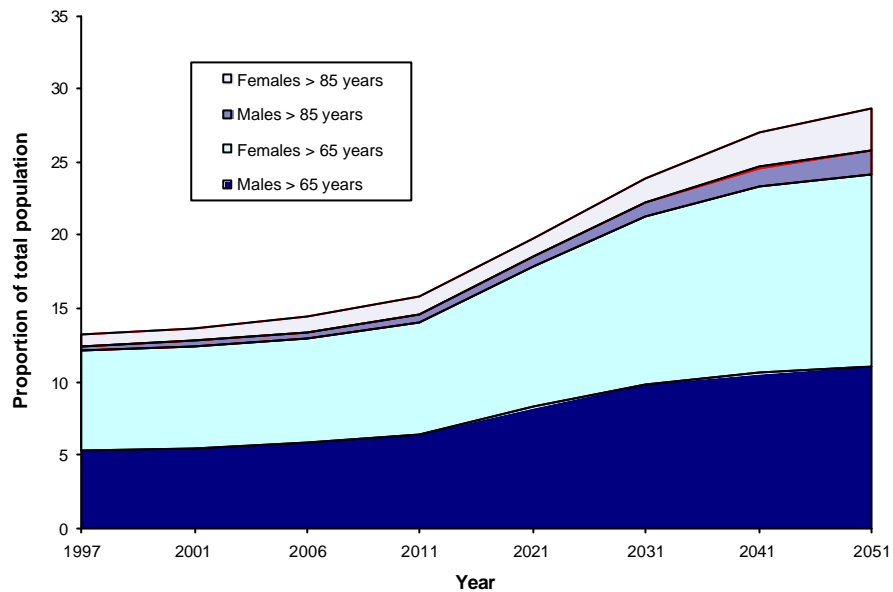


Figure 3: Proportion of Australian population aged over 65 years and over 85 years by gender.

Source: ABS, 1999.

The Australian Bureau of Statistics (ABS) reported that the greatest population increase in Australia occurred in the 85+ year old age group in 2000. They had a growth rate of 6.1 percent compared to the overall average of 1.2 percent in the whole population. Further, like in most western societies, the proportion of older people aged 65 years and older in the Australian community is predicted to increase in the foreseeable future from 11.1 percent in 2001 to 24.2 percent in 2051 (ABS, 1999). This growth will be most pronounced in the 85 year and above age group. While the number of persons aged 65-84 years is predicted to approximately double, the percentage of persons aged 85 years and above is predicted to increase four-fold (ABS, 1999). In 2051, it is predicted that persons aged 85 years and over will increase from 1 percent to 5 percent of the total population compared with 2001 (ABS, 1999). The growth is expected to be most rapid in the period mid-2031 to mid-2041, during which a 50 percent increase is projected in the number of people in this age group (ABS, 1999).

These changes have been largely attributed to greater life expectancy, particularly of women. By 2010, more than half of all women in Australia will be aged over 75 years. In contrast, only around 40 percent of all men will be aged over 75 years. The average age of women is three to four years higher than men and is increasing, with twice as many females as males aged over 85 years (ABS, 1999). Similar trends are apparent internationally. Spain (1997) noted that 64 percent of the US population aged 75 years and over is female. Rosenbloom (1996) added that, among the elderly, women outnumber men by three to two and are over-represented in the very old.

It is predicted that, with the ageing of the population and significant demographic and socio-economic changes, older driver safety is likely to become a much larger issue in the years ahead, in part, as a consequence of the increased number of older, potentially more mobile drivers in the community. Predictions for crash risk of older drivers have been made both in the US and in Australia and these take into account changes in licensing rates, amount of travel, vehicle ownership and access. Given that the next cohort of older

people have grown up with the car, it is reasonable to expect that they will be more likely to retain their licences. The OECD (2001) estimated that the proportion of Australian licensed drivers aged 65 years and over would increase from 13 percent in 2000 to 22 percent in 2030. In the US, it is predicted that licensing rates of men over 70 years will double and that of women in this age group will triple by the year 2020 (Hu, Jones, Reuscher, Schmoyer & Truett, 2000).

It is clear that important ramifications exist for transportation of older women as the current cohort of 'baby-boom' women age. By all measures of current and predicted mobility, including licensure, amount of travel, vehicle ownership and access, future older women will exceed those of previous cohorts. However, with the increase in the number of older women in the population, there are also contradictory trends that make projecting travel patterns, transportation needs and crash/injury risk difficult. For example, tomorrow's older women will have smaller families with fewer children to provide support, aided by high divorce rates among today's younger and middle-aged women. On an age-specific basis, they are likely to be more healthy than today's cohorts, but living longer will also lead to late onset of physical and cognitive disability, leading to substantial challenges in sustaining safe mobility. On the other hand, older women will be more educated and at least a portion will be more affluent, fostering self-sufficiency. Further, they will be better educated and be heads of households (Spain, 1997).

These changes suggest that in the coming decades, demands for increased mobility among older women will be greater for all activities including social outings, employment and recreation. Ageing baby-boom women who keep their licences, who are college educated and who have higher incomes will make more trips per day and drive almost twice as many miles as older licensed women do now. Moreover, using the assumption that females will drive at the same rate as males in the future creates a large difference from the projected numbers of future older drivers based on a continuation of current trends, especially within the oldest age groups. In the age groups of 80 years and over, male drivers currently outnumber female drivers by about two to one. If one assumes that an equivalency in driver licensing will be reached (that is, no gender difference in the proportion of elders holding licenses), the current situation will be exactly reversed, and the number of female drivers will be almost double that of male drivers in the oldest age brackets. This would have the impact of adding one-third more female drivers in the oldest age bracket to the roads in 2040.

Wallace and Franc (2001) recommended that demographic projection and forecasting techniques should be enhanced to include not only the population size and survivorship of older women, but also family and social network size and availability, the level of transportation-related disability and economic access to personal and public transportation. They also recommend that additional targeted research is needed on the personal perceptions of older women with respect to access, acceptability and utility of all modes of transportation and other sources of mobility, as well as personal mobility needs and desires, in order to more effectively plan for mobility needs.

Fildes, Fitzharris, Charlton and Pronk (2001) established projections of the crash risk for future generations of older road users in Australia, taking into account driving behaviour, population migration, personal wealth and health, infrastructure and technological impacts. Figure 4 shows the projected outcomes from this modelling.

They predicted an overall three-fold increase in fatal crashes involving older drivers without active intervention. In 1995 there were 121 older driver fatalities and this was

expected to increase to 341 in 2025, an overall increase of 281 percent above 1995 figures. More importantly, they predicted a greater increase in fatalities for older female drivers compared to older male drivers (an increase of 336% for females and 261% increase for males).

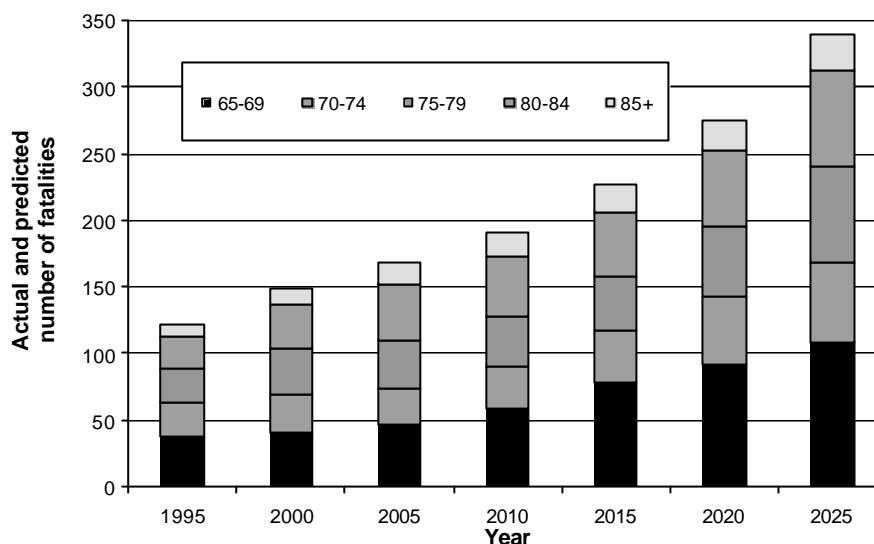


Figure 4 Projected older driver fatalities in Australia, 1995 – 2005.

1.2 GENDER EFFECTS ON DRIVER SAFETY

It is generally acknowledged that there are issues specific to female drivers, compared to male drivers and that there have been major changes in women's roles during the past several decades and this has affected their use of private vehicles (Rosenbloom, 1996). While many areas of women's lives are coming to more closely resemble that of men including overall activity in the labour force, earnings, and amount of travel, there are still gender differences that need to be taken into account when assessing the relative safety of men and women as drivers. The factors that need to be considered include:

- Exposure – men and women differ in their travel characteristics, particularly when and where they drive. Critical issues may include day vs. night driving, urban vs. rural driving, familiar vs. non-familiar routes, extend of peak hour travel, traffic density, and driving conditions.
- Driver experience – women tend to drive fewer annual kilometres than men and are therefore are less likely to be experienced as drivers than men who have held a driver's licence over the same period of time.
- Driving habits – several studies report that men are more likely than women to exhibit more driving violations and higher risk taking behaviour and rate themselves as highly skilled and safe drivers. Men are also more likely to underestimate risk than women in driving situations. Women have been found to comply with safe driving practices more than men (seat-belt usage is higher, less likely to speed or drink and drive).

- Trauma consequences – given their smaller stature and greater frailty, women tend to experience a higher level of trauma than men in a collision of similar severity.
- Driver age – men substantially outnumber women among older drivers, therefore comparing men and women as drivers without reference to age is invalid. Even when men and women of the same age are contrasted, there are, at least for older drivers, several potential confounds related to cohort representativeness. The older women who drive are probably a select group within their cohort in terms of socio-economic, educational and other status measures, some of which may be related to driver safety. A further confound associated with age is that older women are more likely than older men to cease driving voluntarily as they experience disability and health conditions that affect safe driving.
- Vehicle characteristics – women would be more vulnerable to trauma than men if they tend to drive lighter/smaller cars and/or are relatively more likely to be involved in crashes where as a driver they experience side-impact. In addition, because of their short stature, women are required to sit closer to the steering wheel while driving and hence are prone to head strikes on frontal impacts.

A detailed review of the literature addressing these factors follows, with particular focus on the impact of age and gender on travel patterns, licensure, and types of crashes. Following this, a discussion of the factors that may contribute to the increased risk of crash involvement among older women is provided.

1.2.1 Travel patterns and mobility

Mobility is essential for general independence as well as ensuring good health, quality of life and well-being, and one of the most important activities of daily living is the ability to drive. Most people drive to fulfil basic needs such as acquiring food and obtaining health care as well as to fulfil social needs such as visiting friends and relatives, and reaching various activities. Older women, like older men, continue to depend heavily on the private car for transportation and mobility needs and this is increasing (Gelau, Metker & Trankle, 1992; Rosenbloom, 1988).

In providing transportation, the car also meets psychological needs, that is, maintaining independence, autonomy and self-esteem. To most older people, driving is both a symbol of and a means of achieving freedom, independence and self-reliance, and allows them maximum control of their life and mobility. In contrast, forfeiture of driving privileges is considered a major loss for many older adults. It is suggested that older people who are mobile and drive have fewer health problems such as osteoporosis, hip fractures as well as lower use of prescription drugs than 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 (Coughlin & Straight, 1998). Even curtailment of driving usually means relying on others for transportation, incurring potential inconveniences of public transportation, or reducing the number of trips. It is essential, therefore, to understand many transportation issues including personal desires, preferences, social and psychological needs in order to provide safe and ongoing mobility.

The travel patterns of older drivers appear to differ from those of younger drivers. With retirement, the need to regularly commute to a work-place is eliminated and retirement affords older individuals more flexibility in their choices of when and where to drive. Furthermore, the types and frequency of recreation and social trips change with increasing

age (Eberhard, 1996). Most of the literature shows that the amount driven decreases with age (Benekohal, Michaels, Shim & Resende, 1994; Rosenbloom, 1999; LTSA, 2000). In addition, as drivers age, they tend to become more conservative in driving habits. The conditions under which people choose to drive changes with increasing age. In particular, fewer older people drive under difficult or high-risk conditions and their driving speeds tend to be lower relative to younger drivers. Older drivers tend to drive more in daylight and avoid driving at night, they generally avoid busy peak-hour traffic, and other stress-inducing conditions, particularly older women (Hakamies-Blomqvist & Wahlström, 1998; Eberhard, 1996; Benekohal et al., 1994). Older drivers also tend to avoid simultaneous activities such as handling the radio or smoking while driving (Hakamies-Blomqvist & Wahlström, 1998; Ball, Owsley, Stalvey, Roeneker, Sloane & Graves, 1998).

Few studies have sought to identify the travel patterns and relative risk of men and women as drivers. Further, there is great uncertainty in predicting the future participation in traffic and driving behaviour of older women as this seems to be changing more rapidly than that of older men. Nevertheless, there are some noted differences in the driving patterns and licensing rates of older men and women.

The literature points to a distinct gender difference in driving habits and travel patterns, with women of all ages driving significantly fewer kilometres and driving more conservatively than men (Sirén, Heikkinen & Hakamies-Blomqvist, 2001; Rosenbloom, 1999). This is particularly so in the oldest age groups. Anderson et al. (1993) found that women in Australia, on average, drive fewer kilometres per year than men of comparable age. According to results from the 1995 US NPTS, older women drive only about half the annual miles as older men, even though the amount of driving by older males and females rose between 1983 and 1990 (Massie et al., 1995; Hu & Young, 1999). This rise was particularly dramatic for older women – the number of miles driven by men rose by 32 percent, but the mileage driven by women grew 60 percent from 1983 to 1990. Currently, older women in Finland make shorter work trips, make greater use of public transport, make more trips for the purpose of serving another person's travel needs, and drive shorter yearly mileages than older men (Hakamies-Blomqvist, in press). Similarly, others have found that women are also less likely than men to drive at night, rarely drive in unfamiliar areas and almost never on long trips (Anderson et al., 1993; Eberhard, 1996).

Some of the reasons for the lower mileage may include purpose of travel and lack of sharing the driving. First, women travel more as passengers whereas men drive. Cedersund (1990) reported that, when a woman and a man travel in a private car, the male drives in 89 percent of cases. Second, women drive shorter distances than men do and this may be related to trip purpose. While men's trips are mostly work-related or leisure trips, women make trips related to household errands and visiting friends and relatives (Sirén et al., 2001).

Others have noted that older women drive in different locations and at slightly different times than older men. Goggin and Keller (1996) found that older men were more likely to report primarily driving on highways than older women (46% compared to only 17%), and that older women were more likely to report primarily local driving than older men (83% compared to 54%).

Rosenbloom (1999), however, argued that over the next three decades, as retiring women come to resemble men in terms of driving experience, education, professional accomplishments, etc., they may display the same demand for additional travel as now seen

among older men. If this is the case, we may see substantially more travel and less of a decline in trip-making among older women than current travel patterns suggest.

1.2.2 Licensure

Currently, fewer older drivers are licensed compared to younger drivers (Rosenbloom, 2000; Hakamies-Blomqvist, Sirén & Davidse, 2003). Further, fewer women in almost all age groups are licensed compared to men and this is particularly so for older women. For example, Figure 5 shows that licensing rates of Victorian men and women differ in most age groups. For men, licensing rates remain high at close to 100 percent until about age 60 years where the rate starts to decline. At aged 85 years and over, approximately 65 percent of men still hold a licence. For women, however, they are less likely to hold a licence than men in most age groups, but particularly as age increases. In addition, the decline in licensing rate occurs earlier for women than for men, beginning in their 50s. The rate of decline is also more noticeable than for men, with only approximately 20 percent of women aged over 85 years still holding a licence.

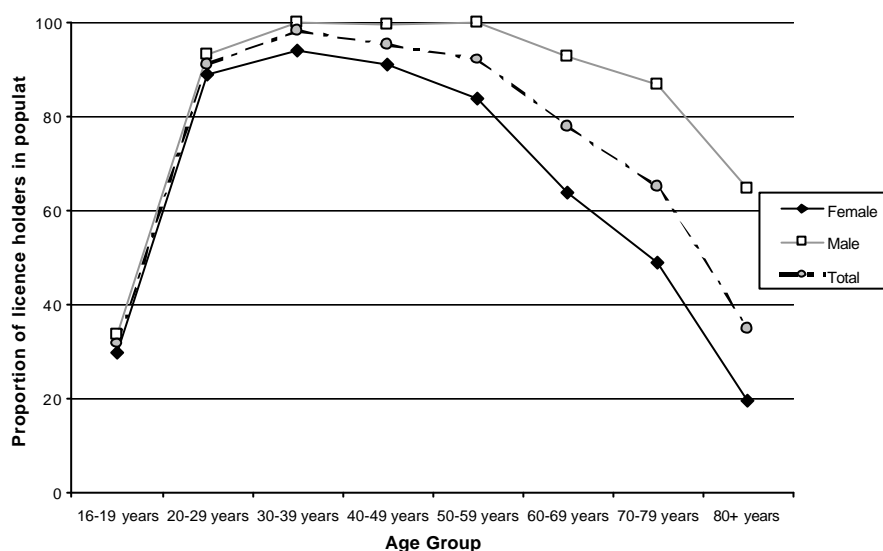


Figure 5: Proportion of licence holders in Victoria by age and gender, 2000.

Source: VicRoads, 2000.

Similarly, US data shows that 82 percent of women aged over 65 years reported themselves as active drivers, but this proportion declined substantially from about age 75 years, with only 36 percent of women aged 85 years and over reporting themselves as currently driving. In contrast, 95 percent of men aged 60-64 years and 78 percent of men aged 85 years and older reported themselves as drivers (Massie et al., 1995). British data show even lower rates of licensed older drivers, with 35 percent of men and only 5 percent of women aged over 80 years of age holding a valid driver's licence (Joint, 1995, cited in Parker, MacDonald, Sutcliffe & Rabbitt, 2001).

This trend is changing, however, with an increase in number of women of all ages obtaining and maintaining their licence and it is predicted that licensing rates among future cohorts of older drivers will be higher, especially for women, owing to the strong desire of baby-boomers to own a car and maintain mobility. Indeed, even in the last decade the difference in self-reported driving status between men and women has narrowed. A

number of reports show that, in the US, there have been substantial changes in the proportion of licensed older men and women (Massie et al., 1995; Raymond, Knoblauch & Nitzburg, 2001). Raymond et al. (2001) reported an increase of 39 percent from of licensed men and women over the age of 65 years from 1989 to 1998. Massie et al. (1995) also examined changes in licensure rates in the US from 1983 to 1990 using the NPTS. They noted that in the mid-seventies, there was a substantial difference between the number of men and women who were licensed to drive. They found increases in the licensure rate in all age groups, but particularly among older people, with an increase from 61 percent of those aged over 65 years in 1983 to 75 percent in 1990. This trend was apparent for both men and women. The licensure rate for older men rose from 80 percent in 1983 to 88 percent in 1990, while the female licensure rate for that age group rose from 48 percent to 66 percent. More recently, Mayhew, Ferguson, Desmond and Simpson (2003) argued that gender differences were disappearing, with women representing almost 50 percent of licensed drivers in 1998.

These trends are likely to continue over the coming decades and it is expected that, with each succeeding generation of older people, the proportion of older women drivers is likely to equal and possibly exceed that of men. Spain (1997) noted that, if baby-boom women keep their licences at the same rate as men do now, 84 percent of women aged 75 years and over will be licensed by 2030.

1.2.3 Types of crashes

The types of crashes older road users are involved in differ from those that younger road users are involved in and may reflect over-exposure of older road users in specific places and times as well as changes in functional performance. In heavy traffic, traffic at high speed, at night on poorly lit roads, at complex intersections or in a potential cash situation, the demands placed on older drivers can exceed their abilities to avoid a crash. Older drivers are more likely to crash during daylight hours and on dry roads compared to younger drivers, are more likely to crash at an intersection and are usually well under the legal blood alcohol content limit.

While the crash patterns of older women drivers are similar to those of older men, there are some reports of gender differences in crash types and responsibility. Very little is known about the crash experience of older women in Australia, nevertheless, international data suggest that the crash characteristics typical to an older driver are more pronounced in older women and emerge earlier than for men.

Stamatiadis and Deacon (1995) and Stamatiadis (1996) examined the relative accident involvement ratio (RAIR, i.e., the relative likelihood of being at-fault divided by the likelihood of being not at-fault) for all multi-vehicle crashes in Kentucky, US between 1990 and 1992. These related studies found that older women have higher RAIRs, i.e., they were more often at-fault in crashes in which they were involved, compared to older men, particularly crashes in urban settings and at intersections. Older female drivers tended to cause more right-angle and angle-while turning crashes, had a high citation frequency for failing to yield and improper turns, had higher crash rates through the day and caused a larger proportion of crashes at intersections. Older male drivers had a higher involvement rate for head-on-while-turning-left crashes, but these also seemed to be a problem for older female drivers, too.

Baker, Falb, Voas and Lacey (2003) examined the characteristics of fatal crashes involving female drivers over 70 years old between 1982 and 2001 in the US using the FARS

database. They found that, compared to fatal crashes involving older male drivers, older female drivers were over-represented in fatal crashes that occurred in 'safe' conditions, during daylight hours, in summer months in good weather conditions, on roads with low speed limits and when traffic is low. Moreover, they found that the character of these crashes had changed over the two decades of data collection. Older women drivers were increasingly involved in collisions where they were the sole occupant of the vehicle and in collisions with other vehicles (angular collisions) at intersections and collisions with fixed objects. Other research has reported similar findings, pointing to particular risk in intersection manoeuvres (Finison & Dubrow, 2002; Guerrier, Manivannan & Nair, 1999; Staplin, Gish, Decina, Lococo & McKnight, 1998).

In her study of factors associated with fatal crashes in Finland between 1984 and 1990, Hakamies-Blomqvist (1994) reported that women involved in a two-vehicle collision were slightly more likely than men (62% versus 58% of such collisions) to have been the driver judged as at-fault. Gender differences in fatality due to type of collision were strongly evident for older women, with older women having higher involvement than older men in side-impact crashes and lower involvement in head-on collisions.

In explaining such gender differences, the role of driving experience is important. In any skilled performance, high experience is an effective buffer against the effect of age-related functional decline. The adage of 'use-it-or-lose-it' attests to this argument. Stamatiadis and Deacon (1995) and Stamatiadis (1996) argued that their findings of higher RAIRs among older women were, in part, due to less extensive driving experience, compared with older male drivers. Hakamies-Blomqvist (1994) also argued that at-fault crashes involving older women were most likely the consequence of lack of attention rather than handling error.

1.3 RISK FACTORS

The causes of older road user crashes are undoubtedly complex and poorly understood, however, the over-representation of older drivers in fatal and serious injury crashes can be partly explained by a range of factors including age-related changes in functional performance, inappropriate risk perception and increased physical vulnerability. While many of these factors can be applied to the risk for all older drivers there seems also to be some specific gender differences, placing older women at higher crash and injury risk relative to older men. For example, lack of driving experience and confidence, prevalence of illness and greater physical frailty can place women at higher crash and injury risk than men. Examining crash-prediction models for older drivers, Hu, Trumble, Foley, Eberhard and Wallace (1998) found that factors that place older female drivers at greater crash risk were different than those influencing older male drivers. Factors that were common to both women and men were: the amount of annual driving, living alone and health disability (particularly experiencing back pain). Risk factors that were specific to older male drivers included employment, history of glaucoma, potential cognitive deficit and use of anti-depressants. For women, additional risk factors included boredom, severe depression and having difficulty extending arms over shoulders.

1.3.1 Health, Disability, Performance and Vulnerability

There is widespread agreement that the normal ageing process generally reduces or slows down sensation, perception, cognition, and physical functioning. 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. 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, Cooney and Tinetti (1998). The most pronounced effect of ageing for all people is the loss of sensory, cognitive and motor skills with advancing years. While there are many individual differences in the ageing process, even healthy adults are likely to sustain some degree of impairment. These changes include the following:

- Declines in visual acuity
- Declines in contrast sensitivity
- Visual field loss
- Loss of auditory capacity
- Reduced perceptual performance
- Reductions in motion perception
- Reduced dark adaptation and glare recovery
- Declines in attention capacity
- Decision time deterioration
- Loss of memory capacity
- Loss of strength
- Postural control and gait changes
- Slowed reaction time
- Declines in cognitive processing ability

While much research effort in the last decade or so has attempted to establish associations between various skills, medical conditions health-related functional measures and crash risk, surprisingly few unequivocal relationships have been found between declines in single functions and crash rates. 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 deterioration of several relevant functions 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).

Many researchers now contend that the older driver problem is mainly restricted to certain sub-groups of older people (for example, those suffering from dementia, those with little or no insight into their changing abilities), rather than encompassing all older people. This evolution represents a shift from a general approach of *‘why* older drivers have high crash risk?’ to a differential focus on high-risk sub-groups and ask *‘which* older drivers have high crash risk?’

Gender differences in older persons’ mortality rates have been well-defined world-wide. Men have consistently higher mortality rates than women and have a shorter life expectancy than women, approximately six years less (Centers for Disease Control and Prevention, 1997). Despite longer survivorship, older women report both greater prevalence of illnesses and more utilisation of health services than older men (Verbrugge, 1983), and are reported to spend a larger proportion of their lifetime disabled, compared to older men (US Administration On Aging, 2002). In a US epidemiologic study of the elderly, women over 70 years of age reported themselves as 1.8 times more likely than men to be disabled in terms of seven activities of daily living (ADLs), 1.9 times more likely than men to have a gross mobility (walking) limitation, and 2.6 times more likely than men to have a limitation in the ability to move their joints (range of motion) (Cornoni-Huntley, Ostfield, Taylor, Wallace, Blazer, Berkman, Evans, Kohout, Lemke & Scherr, 1993). The reasons for this paradox are complex and may include fundamental biological and physiological differences between men and women as well as psychological and

sociological differences in the perception of illness and the threshold for reporting symptoms and disability.

Jylhä, Guralnik, Balfour and Fried (2001) found interesting associations between self-rated health, age and physical disabilities among older women in Baltimore, USA. Not surprisingly, they noted a strong association of fair or poor self-rated health with increasing severity of walking difficulty, but they also found that the likelihood of reporting fair or poor health decreased as age increased. Women aged 65-74 years were 3.7 times more likely and women aged 75-84 years were 3.1 times more likely to report poor or fair self-rated health than older women aged 85 years or older. They argued that there is a complex pattern of association between age and self-rated health and suggested that self-rated health is a global summary measure in which different health-related aspects are taken into account in relation to different contextual frames (e.g., in the context of one's own age and what is considered usual at that age).

Women have been found to have slower reaction times, greater susceptibility to distraction and perceptual errors, and poorer spatial abilities than men (Massie et al., 1995; Warshawsky-Livne & Shinar, 2002). While it may be argued that these can increase crash risk, very little is known about how these health and functional factors affect driving ability. There is some evidence, however, to suggest that some health factors do influence crash risk of older female drivers. Hu et al. (1998) found that women who live alone or who experience back pain had higher crash risk than similar aged men. According to Margolis, Kerani, McGovern, Songer, Cauley and Ensrud (2002), increased risk factors associated with older women drivers (after adjustment for age and miles driven) include exposure (each additional 50 miles driver per week increased crash risk by 14%), a history of falling (one or more falls within the previous year in those who did not walk for exercise increased crash risk by 50%), and physical decline (orthostatic systolic blood pressure drop, poor visual acuity an increased foot reaction time were associated with 10% higher crash risk).

Frailty, susceptibility to injury and poorer capacity to recover from an injury can also explain at least part of the elevated trauma of older road users. With increasing age, biological processes result in a reduction of resilience to trauma and biomechanical tolerance to injury becomes progressively lower, primarily due to reductions in bone and neuromuscular strength and fracture tolerance. Physical frailty is a syndrome characterised by declines in multiple physiological domains, including muscle mass and strength, flexibility, balance and neuromuscular co-ordination and cardiovascular function. In addition to the process of normal ageing, factors that contribute to the development of frailty include chronic illness, poor nutrition, and physical inactivity (Binder, Schechtman, Ehsani, Steger-May, Brown, Sinacore, Yarashaki & Holloszy, 2002). Evans (1991) argued that, once age exceeds about 20 years, fatality risk grows at an approximately uniform rate of 2.3 percent per year for males and 2.0 percent for females. Mitchell (2000) also demonstrated increased fragility with age by setting a fatality index (the risk of an injury being fatal), normalised by the average for the age group 20-50 years. He estimated that the fatality index for older car drivers, passenger and pedestrians rose from 1.0 at ages 20 to 50 years to 1.75 at age 60 years, 2.6 at age 70 years and 5 to 6 for people aged 80 years or more. Essentially, these data mean that, given the same crash and physical insult, an older adult is more prone to serious injury or death than a younger adult.

Women of all ages are more likely to suffer more serious injury than men, given the same physical insult (Evans, 2001; Abdel-Aty & Abdelwahab, 2001; Ulfarsson & Mannering, 2004). There are average physiological differences between males and females that can

affect crash injury severity. Physiological differences can arise from average differences in male/female size and weight and their interaction with vehicle safety design (location and operation of airbag), crash zones, safety-belt design and seating position), as well as differences in the body to withstand impacts (Ulfarrson & Mannering, 2004).

Moreover, once injured, recovery time is much longer for an older person, compared to a younger person. In an article in the Los Angeles Times, Augenstein (2000) noted that:

‘with a little bit of trauma in the elderly, you can go from being an active, well-functioning person to being a non-functioning person. Once somebody is disabled in their late 70s and 80s, their ability to return to where they were before is very poor’.

1.3.2 Awareness of performance changes and risk perception

It is argued that reduced awareness of the impact of ageing on driving skills and inappropriate risk perception may contribute to crash risk among the elderly. While the majority of older drivers are considered cautious and safe drivers, there are reports that some elderly people deny that they are old, identify themselves as younger than their years (Linn & Hunter, 1979), are unwilling to admit that ageing can affect their driving skills (Warnke & Kellner, 1984; Elliott, Elliott & Lysaght, 1995), may be unaware of or reject the impact of ageing on their ability to perform tasks, and may lack appropriate compensation and risk perception skills to participate in traffic safely (Sabey, 1988; Holland & Rabbitt, 1992).

There are also reports that some older drivers justify continuing to drive by assertions of their competency to drive. They i) under-estimate the risk of being involved in a crash, ii) fail to admit to driving errors, iii) feel they have total control to avoid crashes, and iv) believe that a crash would be much more likely to occur through some other cause than their own error (Brainin, 1980; Matthews, 1986).

In a study that examined self-reported perceptions of driving risk among older drivers, Holland and Rabbitt (1994) reported that very few older drivers felt that their abilities, such as reaction time and awareness of traffic hazards, had changed over the years. They also found that older drivers seemed aware of what generally constituted a risky situation, but did not seem aware that some driving conditions, such as complex intersections, have become specifically risky for them.

Matthews (1986) investigated the relationship between perceived skill and/or confidence in driving abilities with perceived risk as a function of age and found that older and younger drivers, compared with middle-aged drivers, saw the risk of crashing as being a problem for their peers but not for themselves. Similarly, they believed that they possessed the necessary skills and abilities to avoid crashes but not their peers. Others have also reported that most drivers tend to believe that they are safer and more skillful than the average driver, although very few studies have explored how older drivers perceive the difficulties of continuing to drive and the accommodations needed to remain safe behind the wheel.

Given that women are generally less involved in crashes, it is possible that they are more cautious than men, less likely than men to have illusory perceptions of their driving skill and engage in risk-taking behaviour while driving (Sivak, Soler & Tränkle, 1989; Kostyniuk, Molnar & Eby, 1996; Shinar, Schechtman & Compton, 2000), and more likely to perceive risks higher than men in many traffic situations (Caird & Hancock, 1994). For

example, Kostyniuk et al. (1996) found that, based on self-report, men engaged in more risky driving behaviours compared with women such as driving at faster speeds and driving with short following headways, were less likely than women to use safety belts and also were more likely to drive under the influence of alcohol. They also noted that older women generally did not engage in risky driving behaviours. Shinar et al. (2000) added that women reported higher rates of adoption of safe driving behaviours (including belt use, observing speed limits and abstaining from drinking and driving) than men of all ages. They also noted, however, that this may result in lower driving experience because of their over-cautiousness and reluctance to drive and therefore heighten crash risk.

Groeger and Brown (1989) found some evidence for gender differences in risk taking behaviour, but also found that these effects disappeared, to a large extent, when driving experience was taken into account. Likewise, McKenna, Stainer and Lewis (1991) found some gender differences in self-assessment of driving skills. They asked participants (58 males aged between 18 and 68 years [mean age 37 years] and 41 females aged between 18 and 61 years [mean age 37 years]) to make judgements of their own driving skills and of the driving skills of the average driver in a range of driving scenarios. The results showed that all drivers judge their own skills as superior to those of the average driver in a wide range of driving scenarios. More importantly, they found that males were more likely to have a higher self-assessment of their driving skills than women, though men and women had a similar conception of the average driver. For men, there was a self-enhancement bias in all driving scenarios. For women, there was a range of areas where they judged themselves as less skilful than the men judged themselves. Interestingly, there were some driving scenarios where women considered themselves as no better than the average driver (reversing, parking, judging the width of vehicles, and navigating while driving in unfamiliar areas). These gender-related differences may well be due to the different driving experiences of average older women and men drivers, since the mileage driven and frequency of driving have been found to be strongly related to self-assessment of older drivers (Marottoli & Richardson, 1998).

In summary, it seems that women, particularly older women, are generally more conservative drivers than men and are less likely to engage in risky driving behaviours. However, there is also some suggestion that older women may be too cautious and hesitant, resulting in a reluctance to drive particularly in 'risky' or complex driving situations and therefore have lower driving experience which may increase risk of crash involvement. This issue is discussed in the following sections.

1.3.3 Confidence behind the wheel and driving experience

A major factor identified in the literature as a risk factor for older women drivers is a lack of up-to-date driving experience and associated lack of confidence in driving. Among older couples, the male partner is generally the principal driver when couples driver together. Noble (undated) reported that, in the UK, women were less likely to be main drivers and more likely to be passengers, and the proportion of drivers decline with age. In the age group 50 to 54 years, 47 percent of women were main drivers and a further 20 percent were 'other drivers' in a household with a car. Three-quarters of women aged 80 years and over were non-drivers, living in a household without a car. However, if and when the male partner is unable to drive, it is often left to the female partner to take on the principal driving role. This may be a stressful experience for many older women who do not have the up-to-date experience and the confidence to get behind the wheel. There are many reports of the benefits of experience and continued practice for skill development and

maintenance and problems for inexperienced drivers in perceiving hazards and possessing the skills needed to avoid risks (e.g., Macdonald, 1994; McKnight, 1997).

This is an emerging concern for older women drivers, since women have a longer average life expectancy than men and also tend to marry older than themselves. It is predicted that seven out of ten baby-boom women will outlive their husbands and many can expect to be widows for 15 to 20 years (US Administration on Aging, 2002). By the year 2020 older women will account for 85 percent of persons aged 65 years and older who live alone.

There is some evidence that older women have less driving experience, both quantitatively and qualitatively than men. This reflects on driving difficulties and there are reports that, compared to men, older women drivers report more difficulties in traffic situations (Bishu, Foster & McCoy, 1991; Rimmö & Hakamies-Blomqvist, 2002), experience several traffic situations as more stressful than men do (Hakamies-Blomqvist & Wahlström, 1998) and have higher overall stress levels while driving (Simon & Corbett, 1996). These experiences of stress might well be associated with higher risk perception and lower risk-taking, compared to male drivers. Women have reported more difficulties in left-turns (equivalent of a right-turn in Australia), at signalised intersections, and stop sign intersections and problems with vision and driving postures (Bishu et al., 1991).

Massie et al. (1995) argued that the higher observed rates for women in non-fatal crashes may be related to driving experience. They suggested that crash rate per mile decreases as the number of miles driven increases because more experienced drivers may be more proficient in the driving task and so are able to avoid crashes better. The fact that women, on average, drive fewer miles than men may increase their crash risk.

Parker et al. (2001) examined confidence in a range of driving situations, self-ratings of driving ability, self-reported driving behaviour and personality and argued that confidence seems to be an important factor in driving performance. They found that surprisingly few older drivers experienced nervousness (less than 5% of the sample), even though the majority were aware of their strengths and weaknesses and recognised changes in abilities with age. They also found that low confidence and high nervousness was associated with being female, relatively low mileage, and a high level of self-reported violations.

Goggin and Keller (1996) found gender differences in driving behaviour and abilities during driver simulation despite no differences in age, educational level, visual acuity or years driving. They argued that these differences may have been the result of strength differences, gender role expectations and marital status as well as greater driving experience of males – males drove more often, under more challenging conditions and for more years than older women.

1.4 REDUCTION AND CESSATION OF DRIVING

A key issue in older driver safety is the consideration of reducing and stopping driving. It is inevitable that at some point, it becomes necessary for individuals to consider retiring from driving. How and when this decision is made, however, may be a traumatic experience for many older drivers.

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 licences after retirement (Transportation Research

Board, 1988; OECD, 2001). Most people drive to fulfil basic needs such as acquiring food and obtaining health care as well as to fulfil social needs such as visiting friends and relatives, and reaching various activities. Moreover, the extent of this need to drive depends on the distance to be travelled from home to these activities and available transportation options. The ability to drive also meets psychological needs, that is, maintaining independence, autonomy and self-esteem. To older people, driving is a symbol of freedom, independence and self-reliance, and allows them maximum control of their life and mobility. Driving reduction and cessation can therefore seriously hamper the personal mobility of the older population. Moreover, the social and psychological impact of loss of mobility is clearly important. Reduced travel has been shown to be associated with increased risk of isolation, declines in physical activity and health and increase in depressive symptoms.

Various studies both internationally and nationally have shown gender differences in the process of driving reduction and cessation, generally pointing to higher likelihood of driving reduction and voluntary cessation at a younger age and in better health by older women compared with older men (Charlton, Oxley, Fildes, Newstead & Oxley, 2003; Gallo, Rebok & Lesikar, 1999; West, Gildengorin, Haegerstrom-Portnoy, Lott, Schneck & Brabyn, 2003; Hakamies-Blomqvist & Sirén, 2003; Hakamies-Blomqvist & Wahlström, 1998; Stutts, Wilkins, Reinfurt, Rodgman & Van Heusen-Causey, 2001). The tendency to modify one's driving with age is stronger among women compared with men. Older women both decrease their mileage and avoid certain stressful conditions to a larger extent than men do (Gallo et al., 1999; Charlton et al., 2003), are more likely to give up driving than men are, and do so for less pressing reasons (Hakamies-Blomqvist & Wahlström, 1998).

Women's decisions to give up driving seem not to be influenced as much by health factors as men's are, however, it also appears that an increasing number of medical conditions are related to driving reduction among both men and women. Fractures, angina, diabetes and self-reported poor vision were related to driving cessation in older women (Forrest, Bunker, Songer, Coben & Cauley, 1997). Notwithstanding, women's driving cessation seems more related to social factors, such as limited driving experience and poor financial status (Eberhard, 1996; Sirén et al., 2001). The most common reason for driving cessation among older Finnish women was that they had no need to drive any more, while for men it was poor health. Women also mentioned financial constraints and fear of traffic more often than men did (Hakamies-Blomqvist & Wahlström, 1998). A US study showed that women were more likely than men to have personal reasons for driving cessation while men were more likely to blame external reasons (Burkhardt, Berger & McGavrock, 1998). Further, personal driving history seems to be related to driving cessation among women. In a UK study, those women who started their driving career later were more likely to give up (Rabbitt, Carmichael, Jones & Holland, 1996). In contrast, an active driving career predicts driving continuation in old age among women (Sirén et al., 2001).

In their study of driving reduction and cessation, Stutts, Wilkins and Schatz (1999) found gender differences in this process. Men were especially reluctant to stop driving, often denying deterioration in driving skills, feeling a responsibility to provide transport and were less willing to accept transportation help from others. Women, in contrast, were more willing to stop driving particularly if another driver was available, and more likely to develop a network of friends and family to help with transportation. They also noted, however, that there was a sub-set of seniors that may prematurely give up driving even though they may still be capable of driving safely. These are typically women who never really enjoyed driving, had a general lack of driving confidence, who were uncomfortable

in the driving environment, and were fearful of crash involvement and had a spouse who enjoyed driving and was readily available to drive. In a related study, Wilkins, Stutts and Schatz (1999) noted that, as women drive less, they may find it difficult to resume driving even when their life circumstances change.

It is interesting to note that, in Queensland, Australia, the number of licences surrendered show an impact of age-based mandatory licence re-assessment, particularly for older women (Figure 6). Women aged 75 years were more likely than men of the same age to voluntarily surrender their licence, evidence of the stress associated with licence re-assessment. Further, peaks for voluntary surrender were generally at younger ages for female drivers than male drivers.

While driving reduction is mostly discussed in a positive way, implying that appropriate reduction and cessation reduces crash and injury risk, there are potential negative implications, particularly if cessation occurs prematurely (and unnecessarily) in terms of personal mobility loss and the trade-off for different travel modes. Studies focussing on the consequences of driving cessation point to negative aspects including increased dependency on other people, decrease in out-of-home activities (Marottoli, Ostfield, Merrill, Perlman, Foley & Cooney, 1993), along with increased depressive symptoms and general well-being (Marottoli, Mendes de Leon, Glass, Williams, Cooney, Berkman & Tinetti, 1997; Burkhardt, 1999), and increased exposure and risk as users of other forms of unprotected transport (pedestrians, public transport, etc.) (OECD, 2001). Therefore, voluntary driving cessation at a relatively early old age, particularly for women who give up driving at a younger age while still physically fit to drive, may indeed be problematic because it may restrict mobility without increasing safety, possibly even decreasing safety (Hakamies-Blomqvist & Sirén, 2003).

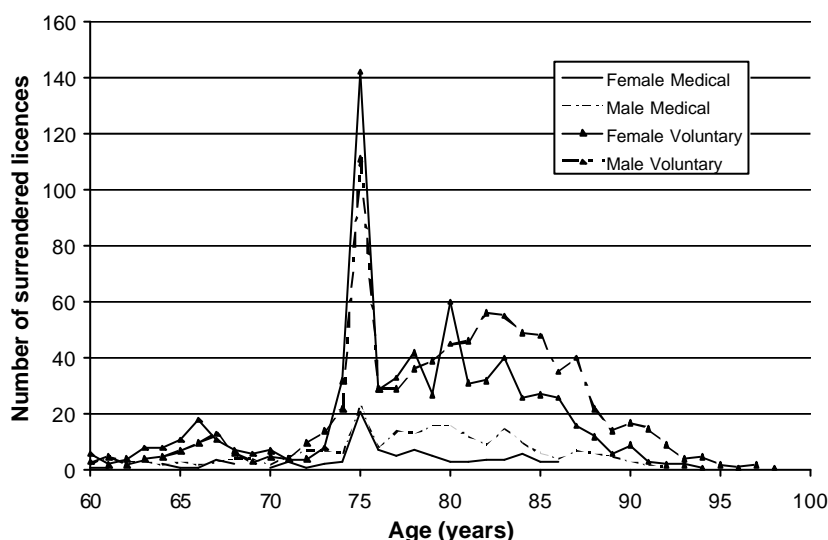


Figure 6: Number of medical and voluntary surrenders of licence, Queensland, 1998.

1.5 SUMMARY

The safe mobility of older women is clearly of concern, particularly given the predictions of increased licensure and amount of travel and associated increase in crash and injury risk in the coming years. As women and the elderly will increasingly use the road and transport

system, the importance of providing a safe environment for them to maintain their mobility becomes apparent.

The relevance of gender to road safety has been recognised and some of the issues relating to the safe mobility of older women have been identified including low annual mileage, low license rates, driving experiences and lack of confidence in driving situations, and health and frailty factors. While the crash risk and mobility needs of older women have been addressed internationally, very little is known about the travel patterns, transportation needs and crash and injury risk to older women in Australia and there is a need to understand their travel patterns and driving experiences in order to develop strategies to support their continued safe mobility.

2 ANALYSIS OF CRASH RISK AMONG OLDER WOMEN IN THE ACT

In an attempt to understand the crash risk of older women drivers in the ACT and to provide some background into the extent of the problem, an analysis of the crash and injury rates of older women drivers in the ACT was undertaken. This chapter presents the details of this analysis, focussing on crash numbers and rates (adjusting for exposure), crash types and injury outcomes.

All crashes in the ACT reported to the Police are recorded by the ACT Department of Urban Services and data are derived directly from Police crash reports. The years for which the data were collected spanned from January 1990 to December 2002. However, for this analysis, data for the years January 1990 to August 2002 were considered as all later data have yet to be validated and checked for errors by the Department of Urban Services. Therefore, the data sample spans 12.66 years.

The information supplied by Urban Services was in three files, the first specifying all persons injured in a road crash, the second specifying detailed information on vehicles involved in these crashes, including crashes in which there were no injuries. The third file contained general information about crashes occurring in the ACT, particularly whether the crash resulted in one or more injuries and some details concerning the configurations of the vehicles involved in the crashes, and road and weather conditions at the time of the crash.

Ideally all this information could be combined to provide a detailed dataset of crashes occurring in the ACT. However, as mentioned by Urban Services, because the information was collected by the Police, for various cases in either types of files there were not corresponding cases in the other types of files. That is, there may be a crash case but no data concerning the vehicles involved. For this reason, the number of cases involved in the following analysis may change depending on whether we are looking at data related to injured or killed persons, cars involved or crash occurrences.

While the numbers of deaths and serious injuries to older car occupants provide some indication that older people are at increased crash and injury risk compared to middle-aged car occupants, a number of factors may influence these trends such as population structure, number of drivers, level of activity and consequent exposure to risk. Ideally, high-risk groups should be identified incorporating some valid exposure measures such as population rates, number of licensed drivers, and kilometres driven. In the ACT (as elsewhere in Australia) little data on kilometres driven is available, therefore population and licensing data is generally used to adjust crash figures, and these have been used for the analyses described here.

The population distribution by age and gender for ACT residents during the period 1990 to 2002 was derived from the ABS and, instead of using the average frequency within each demographic group across the 12.66 years, it was decided to use the 1996 frequencies as the population counts for all the years. This was considered as most appropriate because the data for some years was not easily accessible and the population growth for both sexes in the ACT was fairly linear over the years 1990 to 2002.

It is interesting to note that the proportion of ACT residents aged 65 years and older (7.26%) is lower than the average proportion for other Australian States and Territories and Australia overall (approximately 12%). Like for other Australian jurisdictions, the

proportion of older female residents in the population is higher than that of older male residents (8.15% vs. 6.35%).

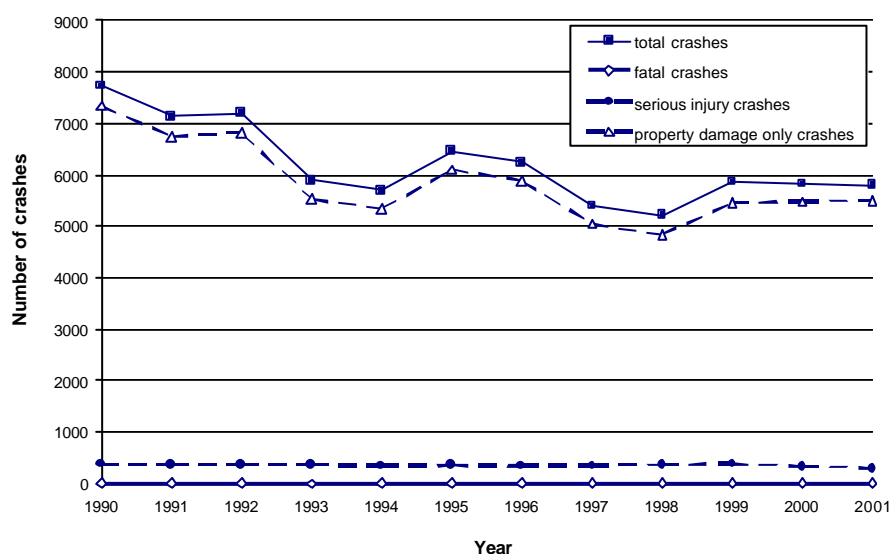
The distribution of licence holders by age and gender for the ACT was also provided by Urban Services. These data were relevant to the current period. The total number of licence holders in the ACT has almost certainly risen significantly over the period 1990 to 2002 and hence the current counts are most likely over-estimates. However, the current counts were used in the present analysis based on the following reasons and assumptions. First, it is not important whether the total number of licence holders is not exact, rather, it is more important that the proportion of licence holders within each demographic group is accurate. It is assumed that variation over the years 1990 to 2002 in the distribution is reasonably small. Second, the data for the total number of licence holders in the ACT varies considerably over the years 1990 to 2002, so the accuracy of any average total that is calculated using the available data cannot be guaranteed.

Current licence counts show that 8.64 percent of all licensed drivers in the ACT are aged 65 years and over. Like for population figures, gender differences were noted here, however, in the opposite direction. Older males formed a greater proportion of the total distribution of licence holders than older females (9.38% vs. 7.87%).

2.1 NUMBER AND RATE OF FATAL AND SERIOUS INJURY CRASHES

From the years 1990 to August 2002 there were 80,298 recorded crashes, of which 75,693 resulted in property damage only. The ACT has enjoyed substantial reductions in the annual number of reported crashes over the last 12 years. As illustrated in Figure 7, the first four years of the last decade showed higher crash rates than other years, with a steady decrease from over 7,700 crashes in 1990 to under 5,700 crashes 1994.

Figure 7: Number of reported crashes and severity in the ACT, 1990 to 2001.



While there was a slight increase in 1995, the number again decreased to a low of approximately 5,200 in 1998. Between 1999 and 2001, the number of crashes has remained stable, on average approximately 5,830 total crashes, of which, on average, 5,480 (94%) were property damage, 345 (5.9%) involved an occupant sustaining serious injury and 10

(0.2%) involved an occupant fatality, annually. In total, there were 195 recorded fatalities to occupants of vehicles between 1990 and 2002 in the ACT.

Information concerning individual persons involved in a crash is only recorded if that individual was killed or sustained an injury in the ACT database. This means that if the driver of a car was not injured but one of the passengers was, no demographic information regarding the driver is available.

Thus, any analysis of driver demographics must be restricted to crashes in which the driver was either injured or killed. However, before making such restrictions, it would be useful to examine the entire population of injured or killed individuals involved in crashes in order to compare the results of the restricted sample of drivers. Figure 8 shows the injury outcome of car occupants injured or killed in a crash by age.

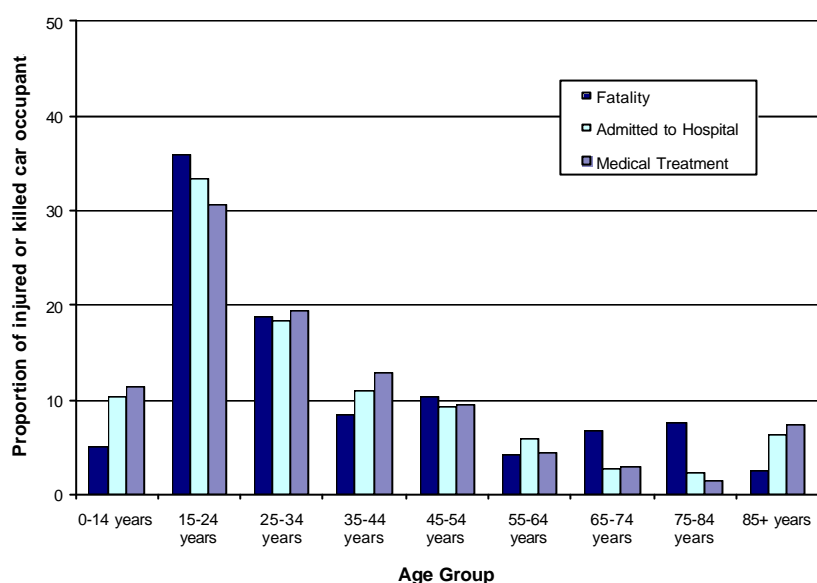


Figure 8: Injury outcome of car occupants by age.

The most at-risk age group for being injured or killed in a crash is the 15 to 24 year old age group, comprising 35.9 percent of all fatalities and 30.7 percent of all those medically treated for injuries between 1990 and 2002. For both injury categories, the proportions within each injury outcome category decreases as age increases. For the fatality category, the proportion of people killed in crashes decreased to 18.8 percent in the 25 to 34 year old age group, to 8.5 percent in the 35 to 44 year age group and then to 4.3 in the 55 to 64 year old age group. At older ages, the proportion of fatalities rose steadily.

When injury outcomes are broken down by gender, some interesting differences appear (Figure 9). The rate of fatalities and serious injuries for males is highest in the 15 to 24 year old age group and decreases fairly predictably as males age with a slight increase in the oldest age group. For females, the proportion killed or injured is comparable lower in the 15 to 24 year old age group and remains fairly stable between 25 and 64 years. Interestingly, younger females are more likely to sustain an injury in a crash, while younger males are more likely to be killed.

For older occupants, the proportion of females killed or injured is greater than the number of males killed or injured. This is particularly so for the 75 to 84 year old age group, in

which an alarming 15.8 percent of female car occupants died in a crash compared with 3.8 percent of males in the same age group. Similarly, younger female occupants are more likely to sustain an injury, while older females are more likely to be killed.

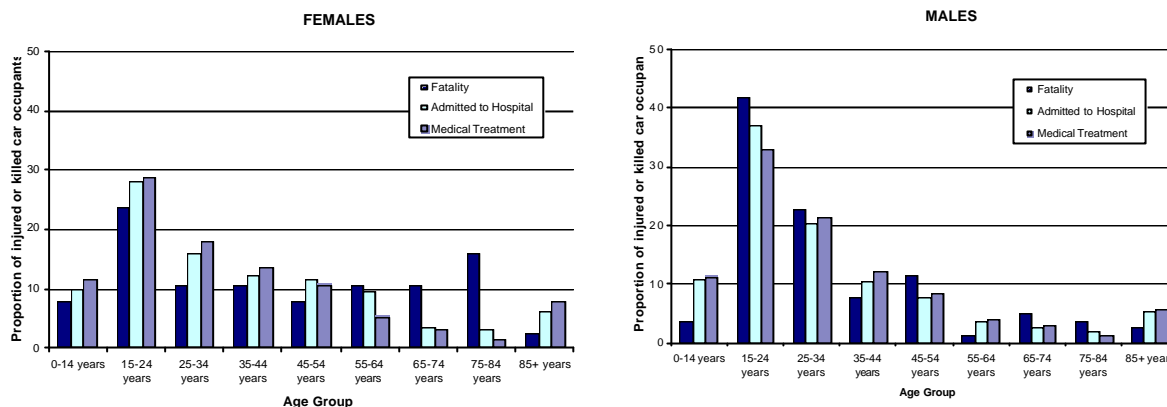


Figure 9: Injury outcome of car occupants by age and gender.

These data indicate that, as car occupants, older females are at greater risk than older males of being killed in a crash. This could be due to either greater frailty, or because they are involved in crashes which are likely to result in a fatality. If it is assumed that the female passenger population statistics by age behave in a similar way to those of males, it would be expected that more older female drivers would be involved in fatal crashes. Therefore, an examination of gender differences between drivers was undertaken.

Between 1990 and August 2002, 1,399 female drivers were injured or killed in crashes in the ACT. Only 16 of these drivers died in the crash, 304 were admitted to hospital and the remaining 1,079 received medical treatment. In the same years, 1,400 male drivers were injured or killed in crashes in the ACT. Forty-one of these drivers died in the crash, 351 were admitted to hospital and the remaining 1,008 received medical treatment. Figure 10 shows injury outcomes of drivers by age and gender.

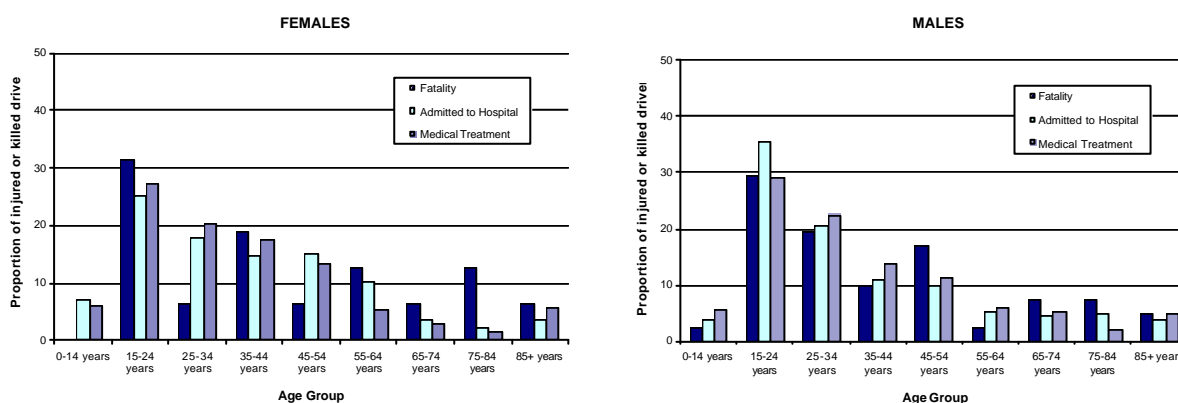


Figure 10: Injury outcome of drivers by age and gender.

Because of low numbers of drivers killed in crashes, it is difficult to confidently examine patterns with respect to mortality rates across age groups and across gender. However, similar patterns emerge for overall car occupant deaths and injuries. Younger male drivers were more likely to be killed or injured in a crash than younger female drivers, while older female drivers were more likely than older male drivers to be injured or killed in a crash.

When these figures are adjusted for population distribution, the safety of older drivers in the ACT is clearly of concern. Figure 11 shows the yearly rate of fatalities for drivers by age group and gender per 100,000 population (based on 1996 population data). Low rates are reported for drivers between 35 and 64 years, however, higher rates are reported for young drivers under 34 years and for older drivers 65 years and over. In almost all age groups male drivers were over-represented in fatal crashes, particularly the oldest drivers aged 75 years and over. The rates for hospital admissions show similar trends.

It should be noted that the number of fatalities in the ACT are small, as is the population, particularly amongst older drivers. These rates therefore show very large fatality rate for older drivers, particularly older male drivers which may over-estimate the problem. While fatality rates Australia-wide show a similar trend, indicating that older drivers are indeed over-represented in fatal crashes per 100,000 population compared to middle-aged drivers, the differences are not as marked as shown in ACT figures.

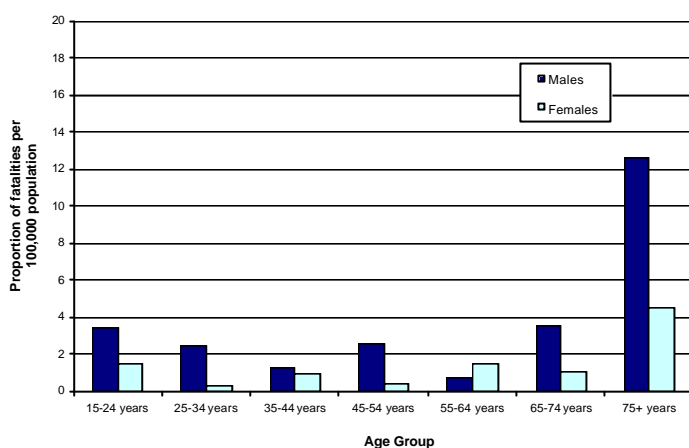


Figure 11: Rate driver fatalities by age group and gender per 100,000 population.

Further, adjustment of figures for licensure rates demonstrates more clearly the increased fatality and hospital admission rates of older drivers involved in a crash. As shown in Figure 12, the oldest drivers are much more likely to die or incur serious injuries in a crash than middle-aged drivers. Older female drivers aged 85 years and over, in particular, are over-represented in hospital admissions compared to their younger counterparts and compared to male drivers in the same age group.

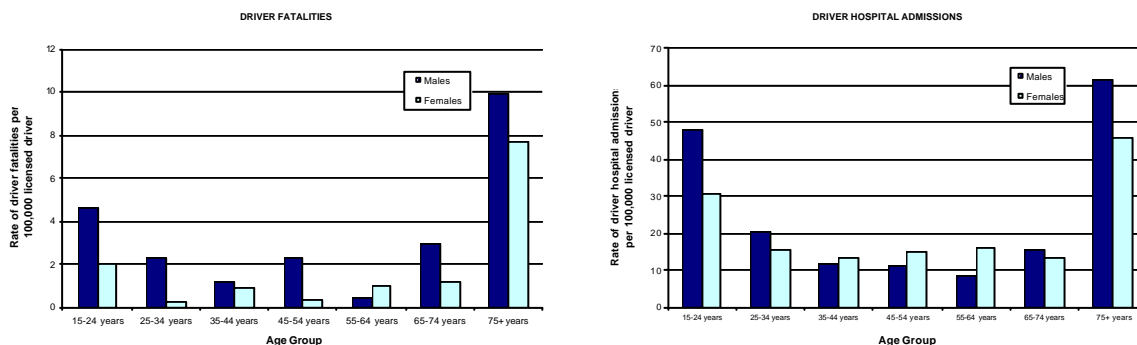


Figure 12: Rate of fatalities and hospital admissions by age group and gender per 100,000 licence holders

2.2 SUMMARY

In summary, the ACT crash data indicate that, in terms of raw numbers, older car occupants are at relatively lower risk of crash involvement and injury risk than younger car occupants, but at higher risk than middle-aged drivers, and that older female car occupants and drivers are at greater risk than older males of being killed in a crash.

When these figures are adjusted for population and licence holder distribution, the death and injury risk of older drivers is even clearer. High rates of fatalities for older drivers compared to younger drivers are noted, particularly for older male drivers. Older female drivers are over-represented in serious injury outcomes.

3 SURVEY OF OLDER WOMEN DRIVERS

In an attempt to collect information on issues surrounding the safety, mobility and transportation needs of older women in the ACT, a survey was conducted among a sample of older women drivers and former drivers aged 60 years or over, in the ACT. A detailed description of the recruitment phase, development of the questionnaire, survey procedure and characteristics of the sample population is provided in the following sections. Following this, the findings of the survey are presented describing the driving and travel behaviours of participants. Key aspects of the analyses for current drivers include socio-economic characteristics, travel patterns, reasons for travel, driving behaviour, confidence in various driving situations, self-reported health and medical conditions, and importance of continuing to drive. For former drivers, socio-economic characteristics are analysed as well as the process undertaken in driving reduction and cessation, reasons for stopping driving, satisfaction with stopping driving and current ability to maintain lifestyle, and some issues surrounding the availability and use of alternative transport options.

3.1 METHOD

Information on driving experiences, driving and travel patterns and transportation needs was sought from older women in the ACT using a self-administered questionnaire. This questionnaire was distributed to a random and representative sample of older women aged 60 years or older.

3.1.1 Questionnaire Development

The questionnaire was designed to gather information on the travel patterns and driving practices of older female drivers, transportation needs, driving decisions, experiences and confidence, thoughts on reduction and cessation of driving, satisfaction with alternative transport options and current mobility, and demographic information. The project research team developed the survey questions based on national and international literature and with input from a number of sources including:

- University of North Carolina, Highway Safety Research Center,
- Federal Highways Administration, US Department of Transportation,
- Swedish National Road and Transport Research Institute (VTI), and
- University of Michigan, Transportation Research Institute.

The questionnaire (Appendix 1) comprised three sections. The first section was completed by all participants and gathered demographic information and information on general health. Women were asked to complete one of the following sections, depending on whether they considered themselves current or former drivers. Section two was completed by current drivers only. This section asked for detailed information about travel patterns, driving behaviour, driving experiences and confidence, recent changes in driving patterns and reasons for any change, difficulty and avoidance of driving situations, self-assessment of driving ability, availability and use of alternative transport, thoughts on reducing or stopping driving and general questions on crash and infringement history. Section three was completed by former drivers only. This section asked for detailed information about

the process and experiences leading up to stopping driving, the experience of stopping driving, availability and use of alternative transport, and satisfaction with current mobility.

Draft versions of the questionnaire were piloted on a group of 10 older women. Revisions were made to the questionnaire based on feedback from the pilot group.

3.1.2 Recruitment

Participants for the survey were recruited through the ACT Council On The Ageing (COTA), utilising the ACT Senior Card membership database. In the ACT, 94 percent of eligible seniors hold a Seniors Card and the database contains basic personal information on all ACT residents who have membership to Seniors Card. To be eligible for an ACT Seniors Card, individuals must be aged 60 years or over, be a permanent resident of the ACT, and not be in paid employment for more than 20 hours per week.

Questionnaire packages including a cover letter, the questionnaire, a consent form for follow-up interview and a reply-paid envelope were sent to COTA and then mailed to a random selection of 2,000 older female ACT residents in March, 2003. In order to target a representative sample of the population of older women in the ACT, the selection was stratified according to age group as follows:

- 528 women aged 60-64 years (birthdate between 1/1/1938 - 31/12/1942)
- 417 women aged 65-69 years (birthdate between 1/1/1933 - 31/12/1937)
- 375 women aged 70-74 years (birthdate between 1/1/1928 - 31/12/1932)
- 327 women aged 75-79 years (birthdate between 1/1/1923 - 31/12/1927)
- 195 women aged 80-84 years (birthdate between 1/1/1918 - 31/12/1922)
- 158 women aged 85+ years (birthdate before 31/12/1917)

All participants were informed that their name had been randomly selected from the Seniors Card membership list and that personal details had not been given to any party. They were invited to complete the questionnaire if they were 60 years or older and either currently drove a car or had ceased driving. If they had never driven a car, they were asked to pass on the questionnaire to another woman who met the specified criteria.

3.2 RESULTS

This section presents the results of the survey. First, some overall information on the sample of respondents is presented, detailing age distribution, marital status, living arrangements, employment status and self-reported health and medical status. Second, the information provided by current drivers is presented. Some associations between age, health status, confidence and driving practices are presented. Third, information provided by former drivers is presented. Here, information on the process leading up to driving cessation and mobility consequences is presented.

3.2.1 Overall Sample Characteristics

A total of 2,000 surveys were mailed to a random sample of older women aged 60 years and over in the ACT. In total, 839 (42%) surveys were returned, however, only 726 of these were complete and were included in the analyses (a nett response rate of 36.3%). Various reasons were given for non-participation including: not at address (69 surveys), never driven (17 surveys), unable to or did not wish to participate (9 surveys), incomplete forms (12 surveys), deceased (3 surveys), and surveys sent to males (3 surveys).

Of the 726 completed and returned surveys, 673 respondents considered themselves current drivers and 53 considered themselves former drivers. Table 1 shows the age group and driver status of survey participants. The majority of participants were aged in their 60s, particularly current drivers. As expected, a greater proportion of former drivers were older, with more than 55 percent aged 75 years or over.

Table 1: Survey participants by age group and driver status.

	Current Drivers (n=673)		Former Drivers (n=53)		Total Participants (n=726)	
	Number	%	Number	%	Number	%
60-64 years	181	26.9	1	2.0	182	25.1
65-69 years	233	34.7	13	24.6	246	33.8
70-74 years	145	21.5	9	16.9	154	21.2
75-79 years	80	11.9	12	22.6	92	12.7
80-84 years	27	4.0	12	22.7	39	5.4
85+ years	7	1.0	6	11.3	13	1.8

Figure 13 shows the distribution of the sample of participants (both current and former drivers) by age group in relation to the population of older women in the ACT. This comparison showed that the sample is generally representative of the population of older women in the ACT, however, may be over-representative of women aged between 65 and 69 years and under-representative of women aged 80 years and older.

Further comparisons of the sample of current drivers with ACT older female licence holders revealed that the survey sample of current drivers was also generally representative of the population of licence holders amongst older women in the ACT, particularly in older age groups above 70 years of age. The sample may, however, be under-representative of women aged between 60 and 64 years and over-representative of women aged between 65 and 69 years (Figure 14).

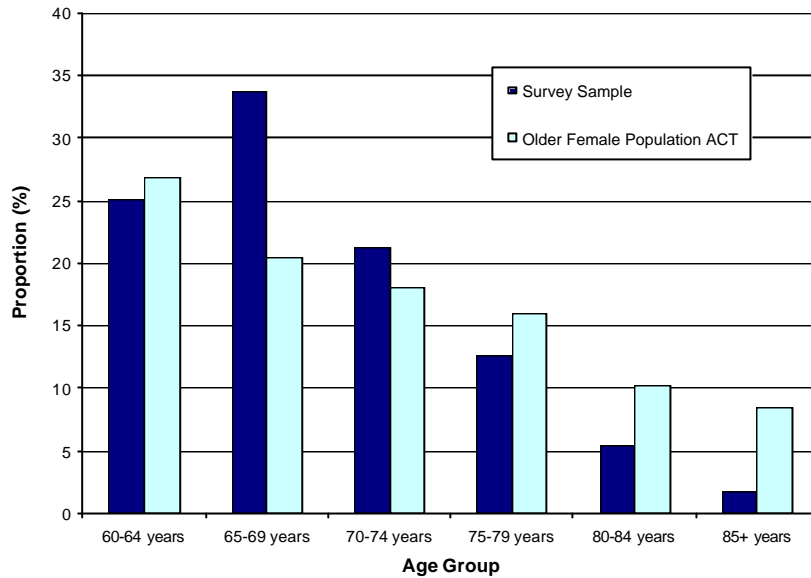


Figure 13: Age distribution of survey sample and comparison with ACT population.

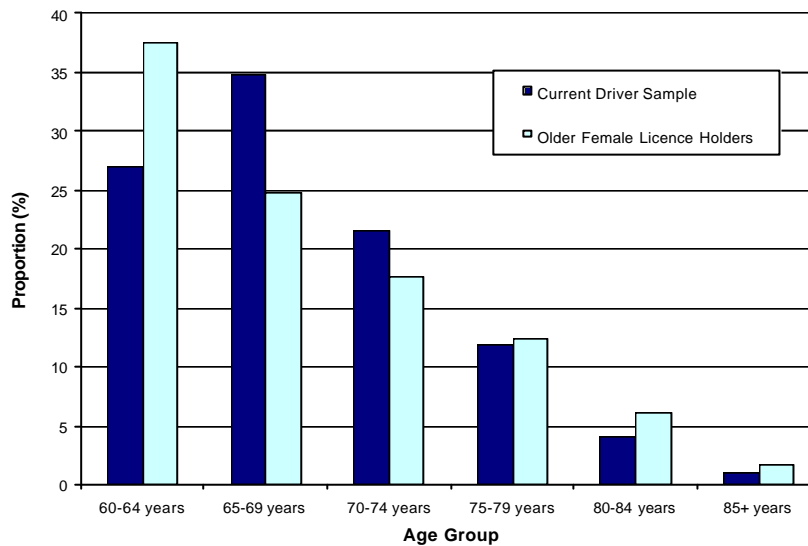


Figure 14: Age distribution of survey sample of current drivers and comparison with older female licence holders in the ACT.

Table 2 provides a summary of other demographic characteristics of the survey participants (both current and former drivers), including marital status, living arrangements, employment status and income level.

Current drivers were more likely than former drivers to be married, and the majority of former drivers were widowed. The majority of participants lived in a private home, apartment or unit, however, former drivers were more likely than current drivers to live in a retirement home or village. Further, current drivers were more likely to be living with a partner than former drivers, while former drivers were more likely to be living alone or with other family members.

Table 2: Summary of demographic characteristics of survey participants

	Proportion (%) of current drivers (n=673)	Proportion (%) of former drivers (n=53)	Proportion (%) of total sample (n=726)
<u>Marital Status</u>			
Married/Defacto	44.1	20.8	42.4
Widowed	32.7	54.6	34.3
Divorced/Separated	16.7	18.9	16.9
Never Married	6.5	5.7	6.4
<u>Type of Housing</u>			
Home/Apartment	95.8	86.3	95.1
Retirement Village	3.1	13.7	3.9
Other	1.1	0.0	1.0
<u>Living Arrangement</u>			
Living with Partner	43.9	16.3	42.0
Living with Family	5.2	14.3	5.9
Living Alone	47.9	69.4	49.4
Other	2.9	0.0	2.7

Other demographic information revealed that the majority of participants (both current and former drivers) were retired (overall 84%) and the majority lived close to their local shops and services (75% lived less than 2 kilometres, with 24% living between 2 and 5 kilometres). Participants were asked to indicate their yearly household income. For current drivers, 24 percent had a yearly income between \$10,000 and \$19,999, 22 percent had an income of between \$20,000 and \$29,999, and 22 percent had an income of over \$50,000. Former drivers generally had lower yearly incomes, with 44 percent of them earning between \$10,000 and \$19,999 per year, 18 percent earning between \$20,000 and \$29,000 and only 16 percent earning over \$50,000 per year.

In addition, participants were asked to rate their overall health status and indicate whether they suffered from any medical conditions, including vision problems, difficulty with daily living tasks and whether they were on long-term medications for any medical condition. Overall, the majority of participants rated their health as either very good or good and only a small proportion rated their health as fair or poor. Current drivers were more likely than former drivers to rate their health as excellent or very good, while former drivers were more likely to report lower health status, $\chi^2_{(4)}=96.3$, $p<0.001$ (Figure 15).

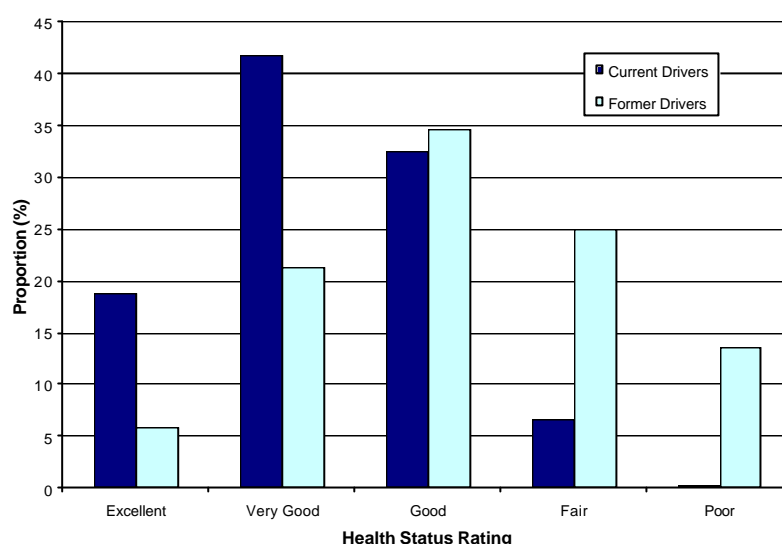


Figure 15: Self-rated health status by current and former drivers.

In addition, former drivers were more likely than current drivers to indicate other health-related problems including vision problems, ongoing medical conditions, difficulty with daily living tasks and taking long-term prescribed medications for an ongoing medical condition. Table 3 provides a summary of these characteristics.

Table 3: Summary of health-related characteristics of survey participants

	Proportion (%) of current drivers (n=673)	Proportion (%) of former drivers (n=53)	Proportion (%) of total sample (n=726)
Reported vision problems	29.3	58.0	31.4
Ongoing medical conditions	40.3	53.1	41.2
Difficulty with daily living tasks	11.4	38.5	13.4
Taking long-term prescribed medication	65.5	84.0	66.9

A wide range of medical conditions were reported, the most common being arthritis, osteoarthritis, high blood pressure, diabetes, heart condition, hypertension and osteoporosis. Likewise, a range of problems with daily living tasks were reported including climbing stairs, lifting heavy objects, kneeling and bending, and walking long distances.

Last, participants were asked about their driving and license status. The majority of participants (94%) indicated that they held a current drivers licence. Sixteen of the 53 former drivers (30%) held a valid licence, even though they indicated that they did not currently drive. Interestingly, six (1%) of the current drivers indicated that they did not have a valid licence, however, indicated that they still drove.

The majority of participants had no restrictions on their licence, however, 18 percent indicated that they had at least one condition or restriction on their licence, most with the condition that they wear corrective lenses while driving. A few participants also indicated that they are required to attend an annual medical check.

Overall, the sample group seemed to be representative of the population of older women in the ACT in terms of population distribution and licensure. The majority of this sample of women were married or living in a de-facto relationship, living independently in the community in their own home or apartment, and either living alone or with their partner. In addition, the sample were generally healthy, with approximately one-third reporting vision problems and approximately 40 percent reporting having an ongoing medical condition, and only 13 percent reporting difficulty with daily living tasks. Some differences were noted between current and former drivers. Generally, current drivers were younger and healthier than former driver, were more likely to be married and living with their partner, and more likely to have higher yearly incomes. Former drivers were more likely than current drivers to be widowed, living alone, have lower yearly incomes, and report poorer health status, more problems with vision, more ongoing medical conditions and difficulties with daily living tasks and more likely to be taking long-term prescribed medication than current drivers.

3.2.2 Current Drivers

Of the total 726 participant, 673 considered themselves current drivers and almost all still held a valid driver's licence. Current drivers were asked a range of questions relating to their driving experiences, driving patterns, self-assessment of driving ability, confidence and avoidance of driving situations, planning for driving cessation, alternative transport options, and crash involvement and infringements.

The vast majority (90%) of drivers had been driving from over 30 years and eight percent had been driving for between 20 and 30 years. The majority of participants drove a small or medium sized car (77%), with another 17 percent indicating that they drove a large car. Further, the majority indicated that they drove a car with automatic transmission (71%).

3.2.2.1 Travel Patterns

Drivers were asked some questions about their travel. Most drivers had driven in the last two days (90%) and the majority indicated that they drove daily or almost daily (65%). Figure 16 shows the amount of driving by age group. No significant age group differences were found, $p=0.42$, however, there was some indication that younger drivers (under 75 years of age) were more likely to indicate that they drove daily (73%), while older drivers (those aged over 75 years) were more likely to indicate that they drove three to four times a week (33%). The majority of drivers (83%) also reported that this has been the typical amount of driving for more than five years.

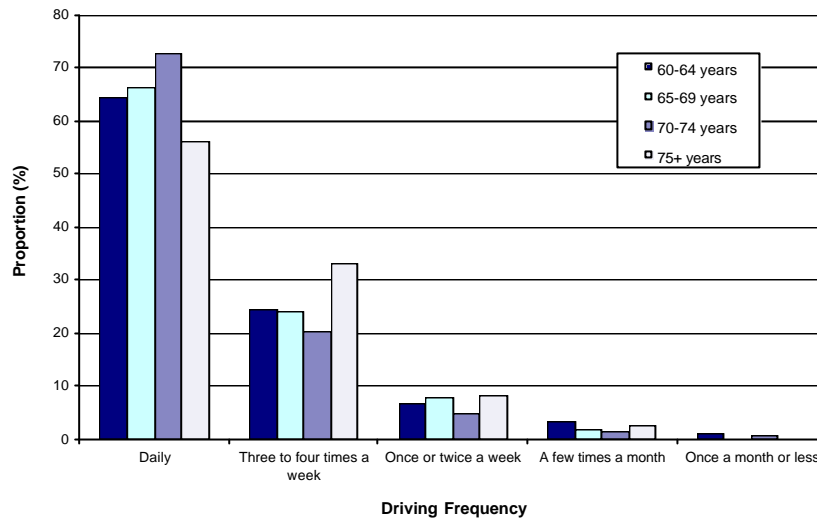


Figure 16: Frequency of driving by age group.

Findings for reported weekly distance travelled generally supported the findings for driving frequency and significant age group differences were found (Figure 17).

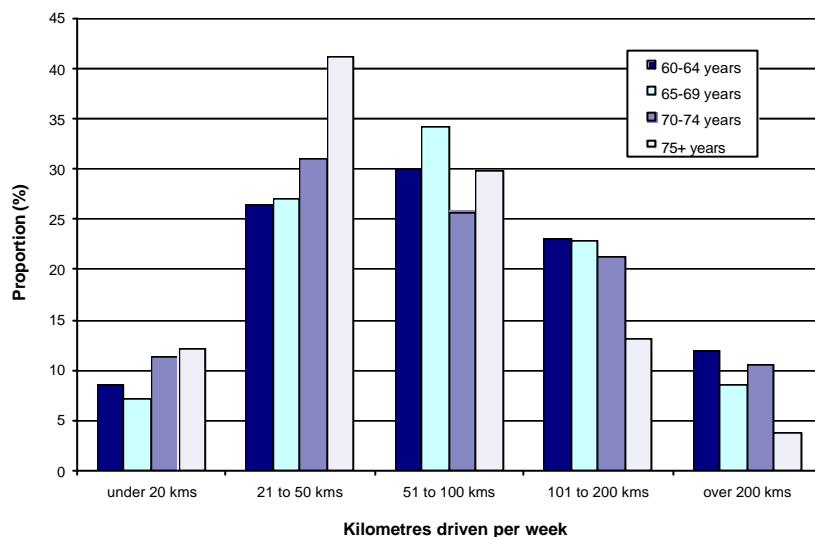


Figure 17: Kilometres driven per week by age group.

Overall, the majority of drivers indicated that they travelled between 21 and 100 km per week. Older drivers were more likely to travel 100 km or under per week, while younger drivers were more likely to indicate that they travelled over 101 km per week, $\chi^2_{(18)}=29.65$, $p<0.05$.

In terms of places driven, the most commonly reported destinations were shopping, visiting family and friends, and social activities. Participants also drove to reach appointments, access health and community services and to transport others. Fewer participants indicated that they drove to sport-related activities (Table 4).

A wide range of other reasons for travel was also given. Some of the reasons for travel included: attending U3A classes, visiting the library, doing voluntary or community work,

going to friendship groups, driving sick husband to medical appointments, various meetings for social groups, holidays and exercise-related trips including dancing classes and going to the gym.

Table 4: Places driven to in a typical week

	Proportion (%) of Current Drivers (n=673)
Shopping (including banking and post office)	99
Visiting family or friends	94
Social activities (e.g., movies, theatre, bingo)	89
Appointments such as hairdresser, accountant	84
Transportation of others (e.g., spouse, friends)	84
Access to community services (e.g., church, library)	82
Access to health services (e.g., doctor, physiotherapist)	82
Sport (e.g., bowls, croquet)	68

Note: Multiple-response question – total may exceed 100%

Drivers were asked a series of questions regarding the amount of driving they did in relation to the availability of another driver in the household and whether they shared the driving with another driver.

A relationship was found between principal driver status and presence of another driver in the household, $\chi^2_{(2)}=290.71$, $p<0.001$ (Table 5). Seventy percent of drivers indicated that they were the principal driver in their household, even though almost half indicated that there were one or more other drivers in the household.

This is not surprising, given that marital status was significantly related to principal driver status, $\chi^2_{(5)}=300.06$, $p<0.001$ and number of other drivers in the household, $\chi^2_{(10)}=446.23$, $p<0.001$. Of those who indicated that they were the principal driver, 74 percent also indicated that they did not have another driver in the household. The majority of drivers (98%) who indicated that they were not the principal driver also indicated that they had at least one other driver in the household. Sixty percent of drivers reported that they shared the driving on long trips.

Further, the majority of drivers indicated that they frequently drove alone (Figure 18). Not surprisingly, age differences were found here. Older drivers were more likely than younger drivers to indicate that they always drove alone, $\chi^2_{(12)}=25.22$, $p<0.05$. This, again, was also significantly associated with marital status, $\chi^2_{(20)}=202.98$, $p<0.001$. Widowed drivers were more likely to drive alone than married drivers.

Table 5: Proportion of drivers reporting as the principal driver in household by availability of another driver in household.

	Number of Other Drivers in Household		
	None	One	Two or More
Principal Driver	73.8	23.2	24.7
Not Principal Driver	1.5	90.4	8.1

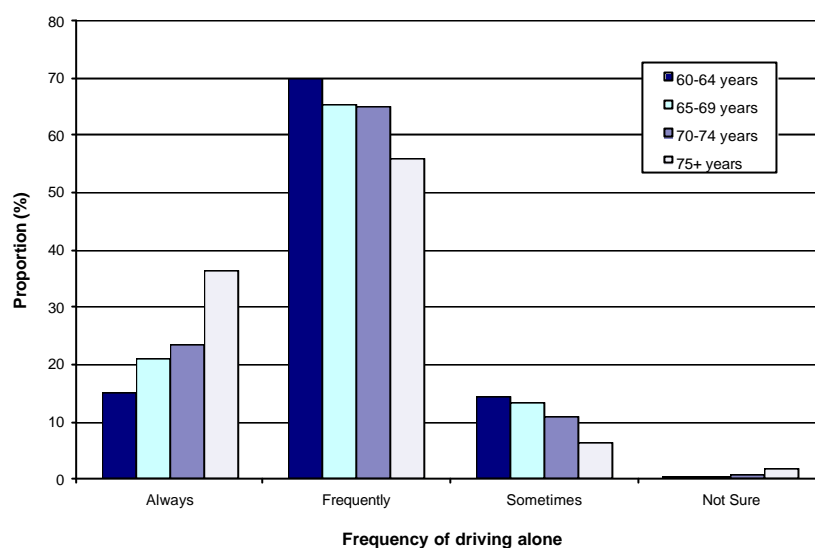


Figure 18: Frequency of driving alone by age group.

Interestingly, a substantial proportion of the sample considered themselves to be the principal driver, however, this was most likely because there was not another driver in the household. As expected, for those who did have another driver available in the household (mostly married women), the vast majority did not consider themselves the principal driver.

3.2.2.2 Driving Experiences

Drivers were asked a series of questions about their driving to examine confidence, preference for having passengers in the car, and difficulty in driving situations. In general, the majority of drivers (60.9%) were very confident that they were safe drivers. There was also some indication, although not significant, $p=0.55$, that younger drivers were more likely to report they were confident of being a safe drivers than older drivers (Table 6).

Not surprisingly, confidence of being a safe driver was associated with principal driver status, $\chi^2_{(3)}=9.17$, $p<0.05$. As shown in Figure 19, those who considered themselves to be the principal driver were more likely to indicate that they were very confident of being a safe driver. In contrast, those who were not the principal driver were more likely to indicate that they were only moderately confident that they were a safe driver.

Table 6: Confidence level for safe driving by age group.

	Confidence Level		
	Very Confident	Moderately Confident	Not At All Confident
60-64 years	64.4	34.4	1.1
65-69 years	63.2	36.4	0.4
70-74 years	57.6	42.4	0
75+ years	54.9	44.2	0.9

It has been reported that some older drivers like to have a passenger to assist with driving. In general, however, the majority of drivers in this sample reported that they did not require a passenger to assist them while they drove (57.3%) or thought that it was not essential for them to have a passenger to assist (31.5%). Only two percent of drivers indicated that they did or would like to have a passenger to assist.

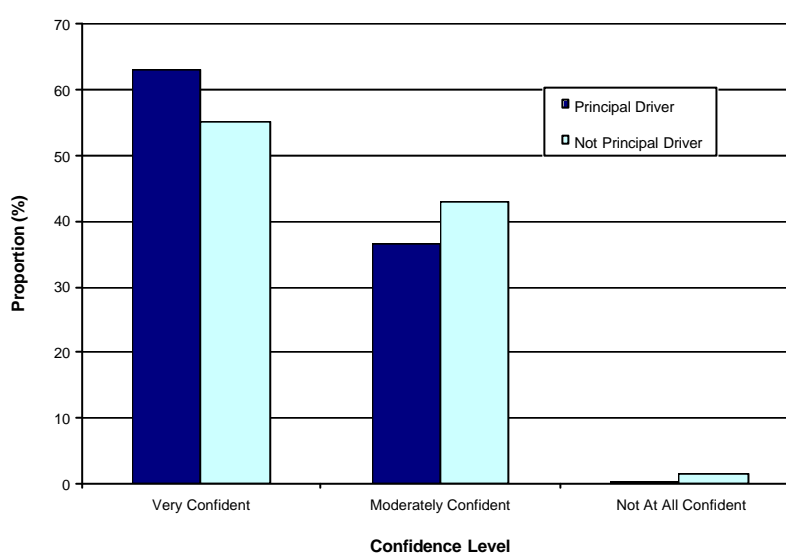


Figure 19: Confidence of being a safe driver by principal driver status

Analyses revealed an association between confidence for safe driving and preference for a passenger to assist. Figure 20 shows confidence levels by the proportion of drivers that preferred a passenger to assist them when driving.

Drivers who reported that they were very confident of being a safe driver most often reported that they did not prefer to have a passenger to assist them when they drove or thought that it was not essential, $\chi^2_{(15)}=25.65$, $p<0.05$. In contrast, those who reported being moderately confident that they were a safe driver were more likely to indicate some preference for a passenger (be it for company only or that they would like to have a passenger but it is not always possible).

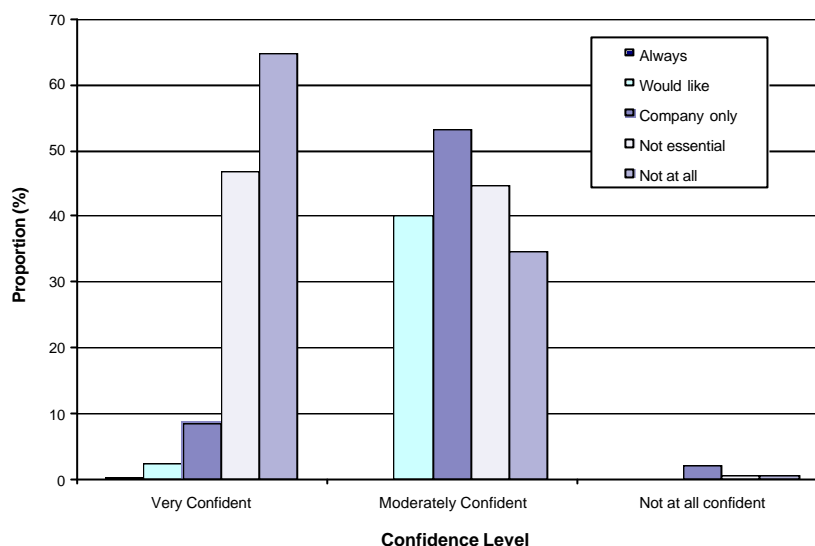


Figure 20: Proportion of participants indicating preference for passenger to assist by confidence in safe driving level.

Drivers were asked to compare some aspects of their driving to five years ago. The vast majority of drivers (86%) reported that their confidence in their driving skills had not changed over the past five years. There were no significant differences by age group, however, analyses revealed an association with problems with vision, $\chi^2_{(3)}=11.12$, $p=0.01$, and a trend with reported health status, $\chi^2_{(9)}=15.13$, $p=0.08$. Those who reported problems with vision and whose health status was fair or poor were more likely to indicate that they were less confident in their driving skills compared with five years ago than those that reported no problems with vision and that their health status was good, very good or excellent.

In terms of changes in the amount of driving done compared to five years ago, there were some differences among the sample of current drivers. While the majority of drivers indicated that the amount they drove had not changed compared to five years ago (72.1%), there were age group differences, $\chi^2_{(9)}=19.95$, $p=0.01$ (Figure 21). Older drivers were more likely to indicate that they drove about the same or less than they did five years ago, while younger drivers were more likely to indicate some change, either driving more or driving less, particularly among those aged 65 to 74 years.

Further analyses revealed associations between change in amount of driving compared to five years ago and reported health status, $\chi^2_{(12)}=33.86$, $p<0.01$, principal driver status, $\chi^2_{(3)}=12.58$, $p<0.01$ and confidence of being a safe driver, $\chi^2_{(9)}=26.96$, $p<0.01$. Those who reported excellent or very good health status, being the principal driver in the household and being confident that they were a safe driver were more likely to drive about the same or more compared with five years ago than those that reported fair or poor health status, not being the principal driver or only moderately confident that they were a safe driver. Conversely, those who reported not being the principal driver and those reporting fair or poor health status were more likely to indicate that they were driving less compared to five years ago.

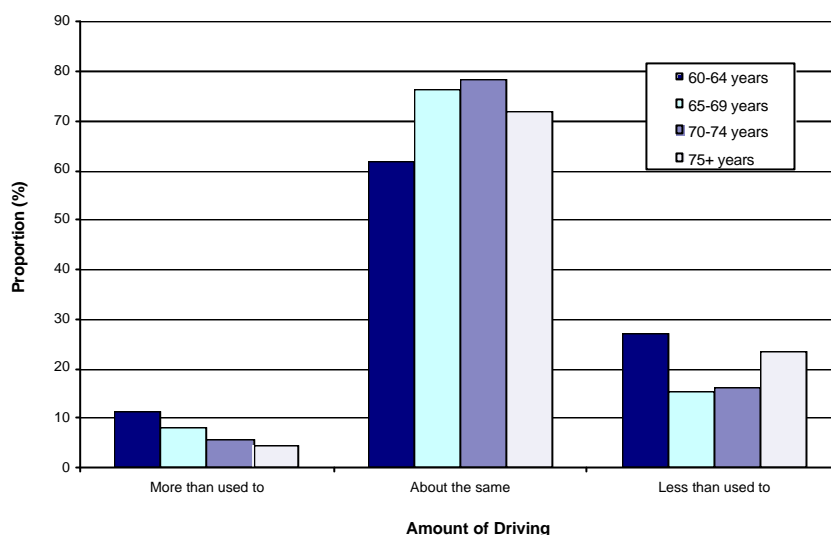


Figure 21: Change in amount of driving compared to five years ago by age group.

Drivers were asked to identify whether particular driving situations are a problem for them and the findings are summarised in Table 7. Overall, drivers were more likely to indicate that they did not have problems with any of the listed driving situations, however, substantial proportions of drivers indicated experiencing problems with driving at night or in poor weather conditions, driving on unfamiliar roads or in unfamiliar areas, the driving style of other drivers, and driving on busy roads. Other reported problems included reversing into parking bays, getting lost, car breaking down and being tail-gated by other drivers.

Table 7: Summary of driving situations that are reported as being a problem.

Driving Situation	Proportion indicating it is a problem
Driving at night or in poor weather	50.2
Driving on unfamiliar roads	36.1
Other drivers	30.9
Driving on busy roads	23.0
Other driving issues	16.6
Some driving manoeuvres	12.2
Driving on major roads	5.2
Uncomfortable car	3.9

Note: Multiple-response question – total may exceed 100%

The relationships between reported driving problems and other variables were analysed, including age group, confidence of being a safe driver, self-reported health status, problems with vision, presence of ongoing medical condition, and difficulty with daily living tasks and some associations were found. The outcomes of these analyses are shown in Table 8.

In general, older drivers were more likely than younger drivers to indicate they experienced problems with the driving style of other drivers, driving on unfamiliar roads and driving at night or in poor weather conditions. Likewise, those who reported vision problems were more likely than those without vision problems to indicate that they experienced similar driving-related problems and also problems on major roads. Drivers reporting fair or poor health status were more likely to report problems driving on unfamiliar roads, at night and in poor weather conditions than those reporting excellent or good health status. While there were no associations between reported medical conditions and problems in listed driving situations, drivers who reported difficulties with daily living tasks were more likely than those without these difficulties to indicate they experienced problems with some driving manoeuvres and the driving style of other drivers.

Those who were moderately confident that they were a safe driver were more likely to report problems in all driving situations than those who reported that they were very confident of being a safe driver. Interestingly, those who indicated they had been involved in a crash were likely to indicate experiencing problems with other drivers. No other problem driving situation was associated with crash involvement.

Table 8: Summary of comparisons between problems with driving situations and other variables.

	Problem Driving Situations					
	Major roads	Other drivers	Busy roads	Difficult manoeuvres	Unfamiliar roads	Night, poor weather
Age Group	n/s	p < 0.05	n/s	n/s	p < 0.001	p < 0.01
Health Status	n/s	n/s	n/s	n/s	p < 0.05	p < 0.05
Vision Problems	p < 0.05	p < 0.01	n/s	n/s	p < 0.01	p < 0.001
Medical Cond.	n/s	n/s	n/s	n/s	n/s	n/s
ADL Problems	n/s	p < 0.01	n/s	p < 0.01	n/s	n/s
Confidence	p < 0.001	p < 0.01	p < 0.001	p < 0.001	p < 0.001	p < 0.001
Principal Driver	p < 0.05	n/s	p < 0.001	n/s	n/s	n/s
Crash Inv.	n/s	p < 0.01	n/s	n/s	n/s	n/s

3.2.2.3 Driving Reduction and Cessation

One of the key issues identified in the literature is the possible premature reduction and cessation of driving among older women and consequent mobility difficulties. Current

drivers were asked a series of questions addressing the issues of driving reduction and cessation, their experiences, and thoughts about stopping driving.

Of the 20 percent of drivers that indicated they had reduced the amount of driving they did in the last five years, the majority (76.8%) indicated that they did this gradually. The most common reason why drivers had adjusted the amount of driving over the last five years was because there was no need to drive as often, with 92.8 percent of participants reporting this reason. Other responses related to discomfort in driving: 39.3 percent of drivers indicated that they didn't enjoy driving or just preferred not to drive as much, while 30.2 percent indicated that they didn't feel as safe as a driver as they used to. In addition, increased use of alternative transport was reported by 30 percent of drivers, changed place of residence by 12 percent, and physical reasons such as movement restrictions and arthritis was reported by 11.3 percent of drivers as reasons why they had reduced the amount of driving they did.

For those who indicated that they had increased the amount of driving they did in the last five years (7.8% of the total sample), 47.1 percent said that it was a gradual process, while 41.1 percent indicated they did this all at once. Some of the reasons given for the increase in amount of driving included: using alternative transport less (15.8%), transporting others (52.4%), changed place of residence (20%), retired and more time for social activities (7.6%), and death of husband/sick husband (9.5%).

In general, drivers had not thought much about the possibility of not driving one day. Forty-two percent had not thought about it at all and 50 percent had only thought a little about it. Health-related issues were associated with this. Those who reported problems with vision and presence of a long-term medical condition were more likely to think about not driving in the future a little or a lot. In contrast, those with no problems with vision or no ongoing medical conditions were more likely to report not thinking ceasing driving in the future at all, $\chi^2_{(3)}=13.40$, $p<0.01$ and $\chi^2_{(3)}=10.53$, $p<0.05$ respectively. There was also some suggestion that older drivers were more likely than younger drivers to have thought at least a little about not driving in the future, $\chi^2_{(9)}=16.14$, $p=0.06$.

Even though drivers had generally not thought much about not driving in the future, a substantial proportion of drivers indicated that they had made some plans for this event. The most commonly report plan for not driving in the future was to become familiar with public transport. Other less common plans included exploring alternative transport options (20.7%), changing type of holiday plan (18.5%), sharing the driving (14.7%), and moving closer to services (11.4%). Under 10 percent of drivers indicated other plans such as moving closer to family, friends, social networks and alternative transport, and talking with family doctor (see Figure 22).

Age effects were found for some of these responses. Older drivers age 75 years or over were more likely to have explored alternative transport options than younger drivers under 75 years of age, $\chi^2_{(3)}=9.64$, $p<0.05$, to have talked with their family doctor about planning for not driving in the future, $\chi^2_{(3)}=19.91$, $p<0.001$, and changed their type of holiday travel, $\chi^2_{(3)}=10.68$, $p=0.01$.

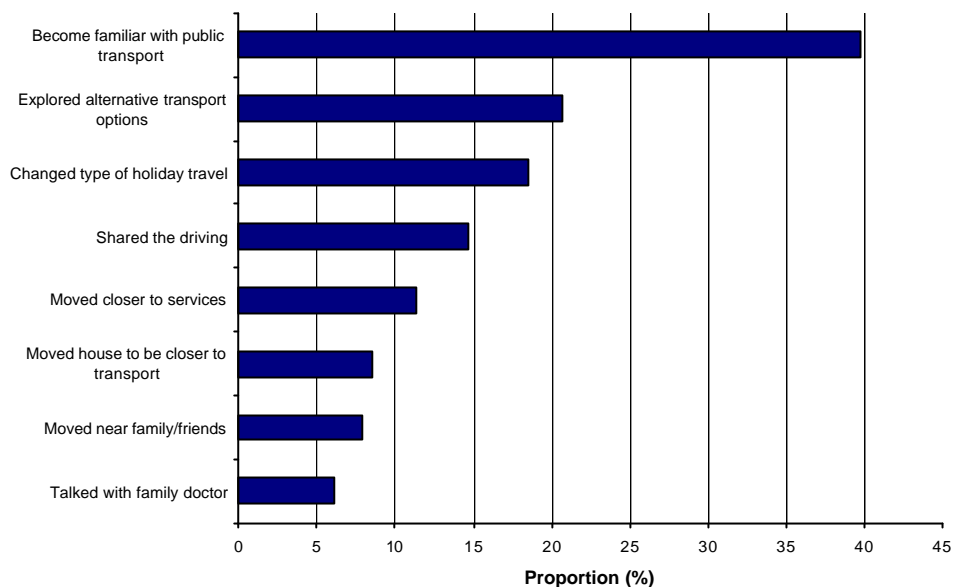


Figure 22: Plans for the possibility of not driving in the future.

Drivers were asked some questions about some of the reasons they might consider limiting or stopping driving and these are listed in Table 9.

Table 9: Summary of reasons to limit or cease driving

Reasons	Proportion
Advice from medical person	88.8
Difficulty with vision	86.4
Loss of confidence or nervousness	84.4
A change in medical condition/s	82.4
A major crash	75.2
A feeling of responsibility to others	73.1
Family or friends raising concerns	70.7
Increased difficulty in some driving situations	63.3
A few 'close calls' or minor crashes	50.1
Requirement for medical/vision testing	39.1
Cost of running a car	32.9
Completing this survey	4.2

Note: Multiple-response question – total may exceed 100%

The majority of drivers indicated that health-related issues would make them think about stopping driving. Interestingly, however, only 39 percent indicated that the requirement for medical or vision testing would make them think about limiting or stopping driving. Other major factors included advice from doctor, a feeling of responsibility, and loss of confidence or nervousness when driving. While three-quarters of drivers reported that being involved in a major crash would cause them to think about limiting or stopping driving, only half of them felt they would consider this if they were involved in minor crashes or ‘close calls’. Further, only about one-third indicated that the cost of running a car would be a factor in limiting or stopping driving.

Drivers were also asked if, over the last two years, anyone had suggested that they should limit or stop driving. Only 16 drivers (2.4%) indicated that this issue had been raised with them. Of these drivers, 50 percent were aged 75 years or over with an additional 30 percent aged between 70 and 74 years old. This small number of drivers then indicated who had made this suggestion to them (see Figure 23).

One-third of drivers indicated that their doctor or GP had raised this issue with them, while another third indicated that their son, daughter, son-in-law or daughter-in-law had suggested they limit or stop driving. A further 13 percent indicated that their eye doctor was the person who raised this issue with them.

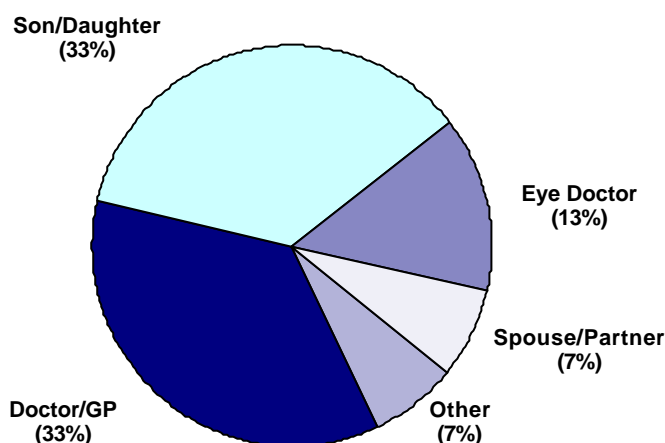


Figure 23: Person who suggested drivers should limit or stop driving

Drivers were asked to describe how they felt about driving. These responses were then subjected to statistical analyses and associations were found between feelings about driving and reported problems in driving situations. Table 10 provides a summary of the analyses.

The majority indicated that they have always enjoyed driving (60.3%), 11.7 percent indicated that they used to enjoy driving more than they do now, 4.4 percent reported that they never liked driving that much and 22.7 percent indicated that they felt that driving was just something that you have to do. Clear associations between feelings about driving and reported problems in driving situations were found. In general, drivers who reported no problems with driving situations were also likely to indicate that they always enjoyed driving. Those who reported problems in driving situations, were more likely to report less positive feelings about driving, with substantial proportions indicating that driving is ‘just something they have to do’.

In addition, the results of further analyses revealed that those who drove frequently (daily, or at least a few times a week) were more likely to indicate that they enjoyed driving than those who drove infrequently, $\chi^2_{(20)}=52.81$, $p<0.001$. Likewise, those who drove more kilometres per week were more likely to indicate that they enjoyed driving than those who drove few kilometres per week, $\chi^2_{(24)}=37.14$, $p<0.05$.

Although there was some indication that age group was associated with feelings about driving, with more older drivers (aged 70 years or over) indicating that they used to enjoy driving more than previously than younger drivers (under 70 years), this did not reach significance, $p=0.072$.

Table 10: Summary of reported problems in driving situations by feelings about driving

		Feeling About Driving			
		Always Enjoyed	Used to Enjoy	Never Liked	Have To Do
Problems driving on major roads	Yes **	15.2	27.3	12.1	45.5
	No	64.1	10.4	3.9	21.7
Problems with other drivers	Yes **	45.4	16.5	8.8	29.4
	No	68.6	8.7	2.4	20.3
Problems with some driving manoeuvres	Yes **	66.4	9.3	2.4	21.9
	No	30.7	21.3	17.3	30.7
Problems driving on busy roads	Yes **	27.5	25.4	15.5	31.7
	No	71.2	6.9	1.0	20.9
Problems driving on unfamiliar roads	Yes **	38.6	19.3	9.4	32.7
	No	73.8	7.0	1.8	17.5
Problems driving at night in poor weather	Yes **	44.5	17.5	6.8	31.2
	No	76.7	5.8	2.6	15.0
Problems with other driving issues	Yes *	44.4	12.1	6.1	37.4
	No	64.1	11.1	4.1	20.7

* differences were significant at $p<0.01$

** differences were significant at $p<0.001$ level

An association between feelings about driving and confidence of being a safe driver was found. As shown in Figure 24, drivers who were confident that they were a safe driver were more likely to indicate that they enjoyed driving than those who were only moderately confident that they were a safe driver, $\chi^2_{(20)}=52.81$, $p<0.001$. Further, those who reported that they were not confident at all of being a safe driver were more likely to report that they did not enjoy driving as much as they used to, that they never liked driving or that driving is just something that you have to do.

In terms of future driving, responses indicated that drivers felt very strongly about keeping driving. Forty percent of drivers thought that they would keep driving for more than ten years and 24.6 percent said that they would drive for between five and nine years, while only 7.8 percent indicated that they would continue to drive for up to four years more. Interestingly, 27.1 percent indicated that they were not sure about how much longer they would continue to drive.

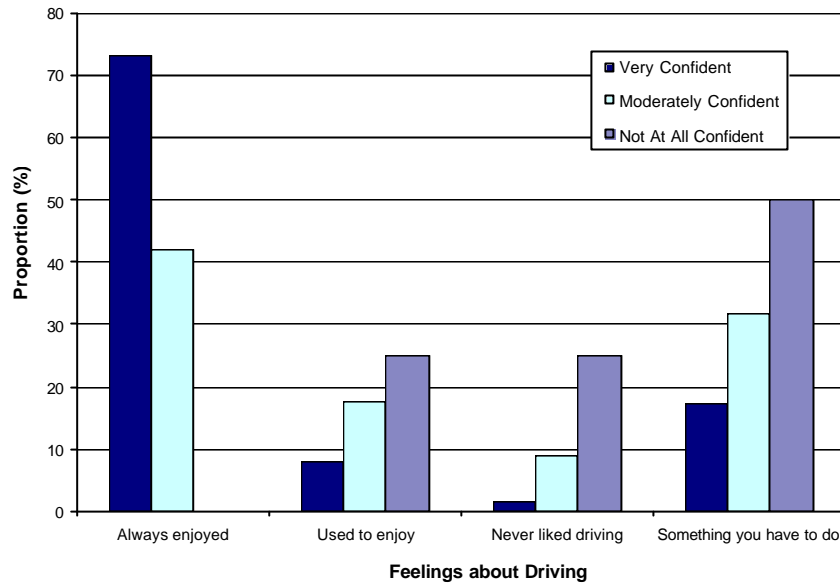


Figure 24: Reported feelings about driving by level of confidence of being a safe driver.

There was an age effect associated with the length of time that drivers thought they would continue to drive, $\chi^2_{(12)}=157.57$, $p<0.001$ (Figure 25).

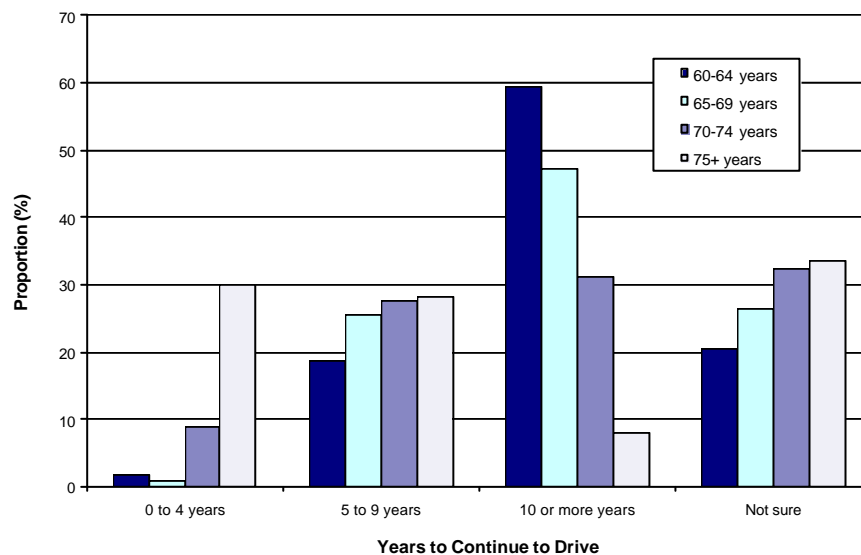


Figure 25: Years to continue to drive by age group.

Not surprisingly, younger drivers aged in their early 60's were more likely than older drivers, particularly those aged 75 years and older, to indicate that they would continue to

drive for ten or more years longer. In contrast, older drivers were more likely to indicate that they would only be driving for a shorter period of time than younger drivers. They were also more likely to indicate that they were not sure about how much longer they would continue to drive than younger drivers.

A number of other factors were associated with years to continue to drive and these are summarised in Table 11. As expected, those that reported excellent or very good health status were more likely than those who reported fair, poor or good health to indicate that they would be driving for another ten years or more. Likewise, those who did not have another driver in the household, those who were confident of being a safe driver and those who drove 50 kilometres or more each week were more likely than those who had another driver available in the household, were not confident and drove less to indicate that they will be driving for another ten years or more.

Table 11: Summary of factors associated with years to continue to drive.

		Years Continuing to Drive				p-value
		0 to 4 years	5 to 9 years	10 yrs or more	Not sure	
Health Status	Excellent	6.5	21.9	52.0	19.5	= 0.089
	Very Good	6.3	25.4	42.2	26.1	
	Good	8.9	24.8	31.8	34.6	
	Fair/Poor	8.7	26.1	39.1	26.1	
Problems with Vision	Yes	6.0	23.9	44.3	25.7	= 0.011
	No	10.9	25.7	31.7	31.7	
Medical Condition	Yes	6.2	27.0	43.1	23.8	= 0.035
	No	8.6	20.7	37.1	33.6	
Problems ADLs	Yes	6.8	24.4	42.3	26.5	= 0.024
	No	13.5	24.3	25.7	36.5	
Other Driver in Household	Yes	11.3	25.3	32.7	30.7	< 0.001
	No	4.3	23.8	48.1	23.8	
Confidence in Being a Safe Driver	Very	5.5	20.1	49.4	25.1	< 0.001
	Moderately	10.9	31.6	26.9	30.5	
	Not	25.0	25.0	25.0	25.0	
Kms Driven per Week	Under 20km	14.0	33.3	21.1	31.6	= 0.027
	21-50km	11.5	23.9	35.9	28.6	
	51-100km	6.7	22.8	38.9	31.6	
	101-200km	3.9	23.3	51.9	20.9	
	Over 200km	5.2	25.9	51.7	17.2	

Interestingly, those who reported having some vision problems, ongoing health problems and difficulties with activities of daily living also indicated that they will be driving for another ten years or more.

Moreover, the majority of drivers indicated that keeping driving for as long as possible was very important (58.7%) or important (34.8%) to them. Only 5.3 percent indicated that driving for as long as possible was not important to them. Surprisingly, there was no age effect for this response, $p=0.75$. Nor were there any relationships between importance of keeping driving for as long as possible and health-related factors (overall health status: $p=0.18$, problems with vision: $p=0.27$, ongoing medical conditions: $p=0.35$, difficulties with daily living tasks: $p=0.47$).

However, relationships between driving for as long as possible and other factors were found. For example, Figure 26 shows that those who considered themselves to be the principal driver were more likely to indicate that it was very important to keep driving for as long as possible than those who did not consider themselves to be the principal driver, $\chi^2_{(3)}=21.16$, $p<0.001$. Not surprisingly, the presence of other drivers in the household was also related to the importance placed on keeping driving, $\chi^2_{(6)}=12.47$, $p=0.052$, where those who did not have another driver in the household were more likely to indicate that it was very important to keep driving for as long as possible. In contrast, those who had one or more other drivers in the household were more likely to indicate that it was not important for them to keep driving for as long as possible.

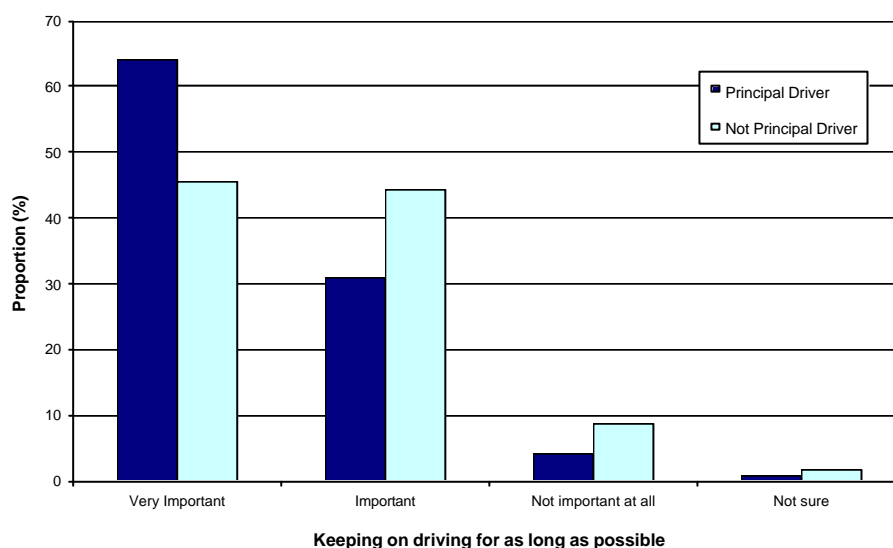


Figure 26: Importance of keeping driving by principal driver status.

Frequency and amount of travel were associated with keeping driving. Those that drove frequently (at least once or twice weekly) and longer distances (over 50 kms per week) placed more importance on keeping driving than those who drove less frequently and shorter distances, $\chi^2_{(15)}=62.73$, $p<0.001$ and $\chi^2_{(18)}=43.97$, $p<0.01$, respectively. Feelings about driving and confidence of being a safe driver were also associated with importance of keeping driving and feelings about driving, $\chi^2_{(12)}=63.09$, $p<0.001$ and $\chi^2_{(9)}=24.51$, $p<0.01$, respectively. Those who enjoyed driving and were very confident that they were a safe driver were more likely to place importance on keeping driving for as long as possible compared to those who never enjoyed driving and who were not confident that they were a safe driver.

Drivers were asked to identify some concerns about no longer being able to drive. As shown in Table 12, the majority of drivers indicated a range of concerns including loss of independence, problems reaching services, and social problems.

Table 12: Concerns about no longer being able to drive

	Concerned or not (%)	
	Yes	No
Concerned about losing independence	94.7	5.3
Concerned about not meeting needs	82.4	17.6
Concerned about inconvenience	91.5	8.5
Concerned about ability to visit family and friends	84.6	15.4
Concerned about decreased options for social activities	83.9	16.1
No concerns	26.9	73.1

Further, as expected, importance placed on keeping driving was associated with concerns about not driving (see Table 13).

Table 13: Importance placed on keeping driving for as long as possible by concerns about no longer being able to drive.

	Importance placed on keeping driving (%)				p-value
	Very Important	Important	Not Important	Not Sure	
Concerned about losing independence	64.2	33.2	1.9	0.7	<0.001
Concerned about not meeting needs	67.5	28.8	2.9	0.8	<0.001
Concerned about inconvenience	60.1	35.5	3.2	1.2	=0.047
Concerned about ability to visit family and friends	64.7	32.6	1.2	1.5	<0.001
Concerned about decreased options for social activities	67.4	30.8	1.0	0.8	<0.001
No concerns	28.2	40.8	29.6	1.4	<0.001

Those who were concerned about losing independence and not wanting to rely on others for transport, who were concerned about not being able to meet their needs, concerned about inconvenience, concerned about not being able to visit family and friends, and concerned about decreased social activities placed more importance on keeping driving for as long as possible than those who were less concerned about these issues.

3.2.2.4 Satisfaction with driving experiences and mobility

Participants were asked some general questions on their satisfaction with their current driving experiences and mobility needs. Overall, the majority of participants (91%) were satisfied with the amount of driving they currently undertake, with 4.3 percent indicating they would like to drive more and 3.4 percent indicating they would like to drive less.

For those who indicated that they would like to drive more than they are currently driving, reasons given for not driving more included: health or medical problems (40.9%), lack of opportunity (60%), cost of running a car (40%), and advice by others to reduce driving (15.8%). For those who indicated that they would like to drive less than they are currently driving, reasons given for not driving less included: responsibilities for transporting others (19%), need to drive for work (14.3%), need to drive for social purposes (14.3%), need to drive to get to services (19%), no alternative transport available (9.5%), and problems with public transport such as being restricted and time consuming (9%).

Some questions were related to alternative transport options. Participants were first asked about the types of transportation that are available to them and, of those available, how often they used them (Figure 27).

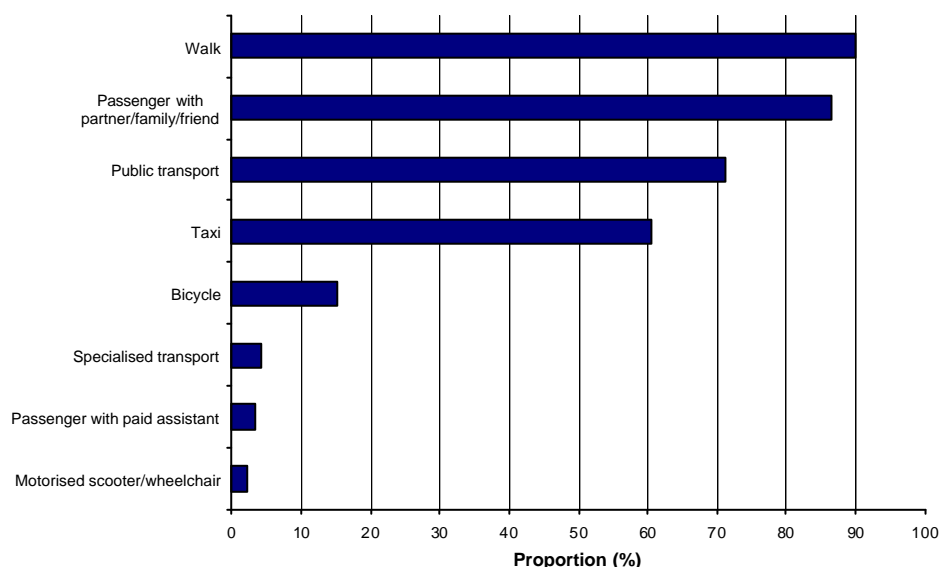


Figure 27: Alternative transportation options available to participants.

A number of alternative transport options were available to participants. The majority of participants indicated that they were able to ride as a passenger with family or friends, and that walking, public transport and taxi use were available transportation options. Few indicated that riding with paid assistants or volunteers, using specialised transport services or using a bicycle or motorised wheelchair/scooter were available options for them.

Those who indicated that various alternative transportation options were available to them were then asked to indicate whether they actually used this form of transport. As shown in Table 14, if available, participants tended to use some options frequently, but other options rarely. Riding as a passenger in a car with a partner, family or friends was used often or sometimes by 88.1 percent of participants who said this option was available to them. Likewise, 89.9 percent of participants reported that they walked often or frequently. In contrast, even though options were available to them, a large proportion of participants rarely or never used options such as riding as a passenger with a paid assistant or volunteer (53.9%), used public transport (59.7%), used a taxi (83.2%), cycled (57.9%), or used specialised senior transportation services (95.4%).

Table 14: Frequency of use of alternative transportation options.

	Use of transportation option (%)			
	Often	Some-times	Rarely	Never
Ride as passenger with partner/family/friends	43.3	44.8	11.7	0.2
Ride as passenger with paid assistant/volunteer	23.1	23.1	15.4	38.5
Public transport	7.1	33.2	48.2	11.5
Taxi	1.6	15.2	73.5	9.7
Walk	46.4	43.4	9.2	1.0
Bicycle	10.1	31.9	39.1	18.8
Specialised transportation	0	4.5	13.6	81.8
Motorised scooter	11.1	33.3	11.1	44.4

3.2.2.5 Crash and infringement history

Drivers were asked to indicate whether they had been in a crash or incurred any traffic infringements (other than parking fines) over the last five years. Only 75 (11.5%) participants reported that they had been involved in a crash and 86 (13%) had incurred infringements. Given that the numbers of reported crashes and infringements were low, there were few associations with other factors, such as age group, health-related factors, most reported problem driving situations, and confidence of being a safe drivers.

No associations were found between traffic infringements and any other factors. There were, however, some associations between crash involvement and other variables, particularly exposure factors. For instance, those who drove more kilometres per week were more likely to have been involved in a crash than those who drove fewer kilometres per week, $\chi^2_{(6)}=14.31$, $p=0.026$ (see Figure 28).

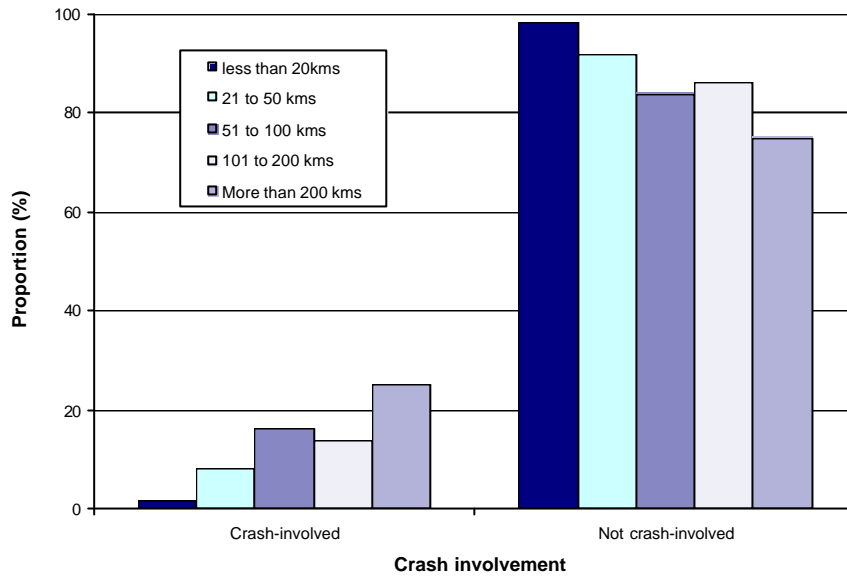


Figure 28: Crash involvement by kilometres travelled per week

Similarly, those who drove more frequently (at least three to four times per week) reported being involved in more crashes than those that drove less frequently (once or twice a week or less), $\chi^2_{(4)}=10.79$, $p=0.029$.

Interestingly, principal driver status was also associated with crash involvement. Those that considered themselves to be the principal driver in the household were more likely than those who did not do most of the driving in the household to have been in a crash in the last five years (Figure 29).

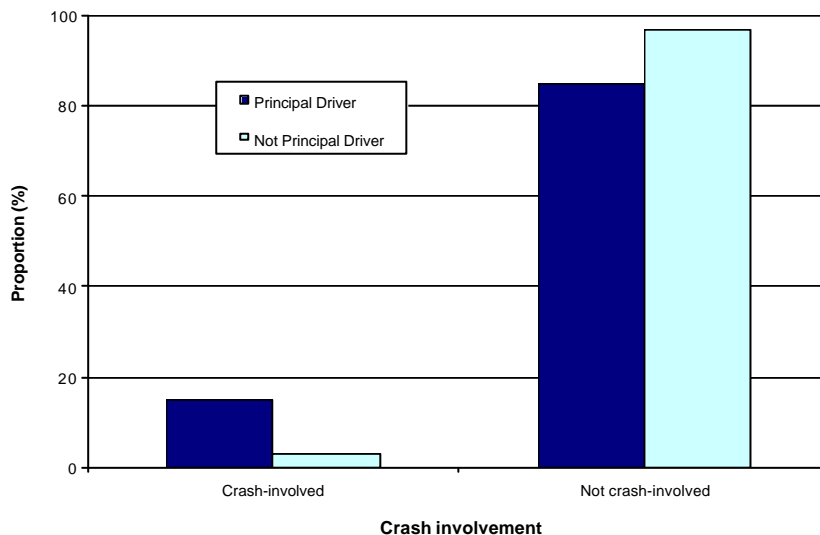


Figure 29: Crash involvement by principal driver status

In addition, there was some suggestion that crash involvement was associated with confidence of being a safe driver, $p=0.78$. Those who had been involved in a crash were more likely to report that they were not at all confident of being a safe driver. In contrast,

those who had not been involved in a crash were more likely to indicate that they were very confident that they were a safe driver.

3.2.3 Former Drivers

In addition to general demographic questions including age group, living arrangements, and health status, former drivers were asked to provide information about when they used to drive as well as how they get around since they stopped driving. This section presents the responses from those who considered themselves to be former drivers. Given that the sample size was low (only 53 respondents), few tests of statistical significance were undertaken. Nevertheless, the information gained from this survey provides some important information on the processes of driving cessation and consequent mobility changes.

As noted previously, former drivers were generally older than current drivers, with 56.6 percent aged 75 years or over. In addition, the majority of them were widowed (54.6%), living alone (69.4%) and living in their own home or apartment (86.3%). Further, the majority of this group reported some health-related problems including vision problems (58.0%), ongoing medical conditions (53.1%), difficulty with daily living tasks (38.5%) and taking long-term prescribed medication (84.0%).

Most former drivers had given up driving over five years ago (54.5%), and a substantial proportion (32.8%) had given up between three and five years ago. Only a small proportion (10.9%) had stopped driving less than a year ago. In addition, 32 percent of former drivers indicated that they still held a valid drivers licence.

The majority of participants indicated that there were no other drivers in the household at the time that they stopped driving (64.8%). About one-quarter indicated that there was one other driver in the household at this time.

3.2.3.1 Driving experience

Participants were asked a series of questions relating to when they were driving including driving experience, driver status, crash involvement and feelings about driving.

The majority of participants were experienced drivers, with 46.3 percent having driven for more than 30 years and another 33.3 percent having driven for 21 to 30 years. Only 5.6 percent of the sample had only been driving for less than five years. In addition almost 60 percent indicated that they did most of the driving in their household in the last five years of driving.

Participants were asked to describe how they felt about driving. Overall, 41.8 percent of participants indicated that they enjoyed driving, while 18.2 percent indicated that, while they did enjoy driving overall, they did not enjoy it much when they stopped. Another 14.5 percent reported that they never liked driving that much, while 23.6 percent reported that driving was just something that needed to be done. Household driver status (when they were still driving) was associated with these feelings. Those who did most of the driving in the last five years of driving were more likely to indicate that they enjoyed driving than those who were not the principal driver in the household (Figure 30). In contrast, those who did not do most of the driving were more likely to indicate that they never liked driving and that driving was just something that had to be done than, $\chi^2_{(8)}=31.24$, $p<0.001$. Likewise, those who indicated that they had other drivers available in the household when

they stopped were more likely than those without other drivers available to indicate that they never liked driving that much or that driving was just something they had to do, $\chi^2_{(4)}=9.70$, $p=0.046$.

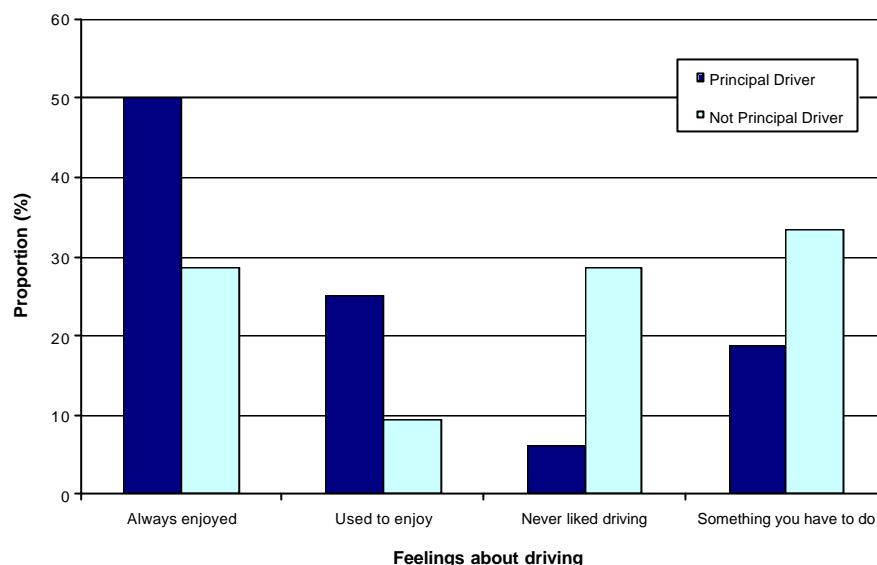


Figure 30: Feelings about driving by principal driver status.

Participants were also asked to indicate whether their feelings about driving changed just before they stopped and to describe this change. Only 13 respondents (24.5%) indicated that their feeling had changed, and there was some indication that this was associated with general feelings about driving, $p=0.071$. Not surprisingly, those who indicated that they used to enjoy driving but less so when they stopped indicated that their feelings had changed. For all other categories (always enjoyed, never liked and driving was just something to do), these feelings generally did not change just before participants stopped driving.

A range of reasons was given for changed feelings, many focussing on loss of confidence, health-related reasons, and responsibility. Some of the responses included:

“Decided my eyesight was not the best, it would be irresponsible to risk lives by driving.”

“I was beginning to feel unsafe.”

“No longer confident to operate brake and accelerator, steering wheel (weakness in legs and hands).”

“Unsafe driving at night – light on oncoming cars confusing.”

“Back trouble meant I felt unable to turn to see the traffic.”

3.2.3.2 The decision to stop driving

Much of the literature on driving cessation indicates that making the decision to stop driving is an extremely difficult decision for older drivers and can be devastating for many, particularly if they do not make this decision themselves.

Participants were asked a number of questions about the processes and experiences they went through when making this decision. First, participants were asked if they stopped driving all at once or gradually. Interestingly, the majority of participants (58.1%) reported that they stopped all at once. Moreover, the majority indicated that they did not experience any difficulty making this decision (66.0%). This was so, despite it being a gradual or abrupt/sudden process. There was some indication that those who had stopped all at once found it to be a more difficult decision than those who stopped gradually, while those who stopped gradually found it a less difficult decision than those who stopped suddenly (see Figure 31). However, this effect failed to reach significance, $p < 0.05$.

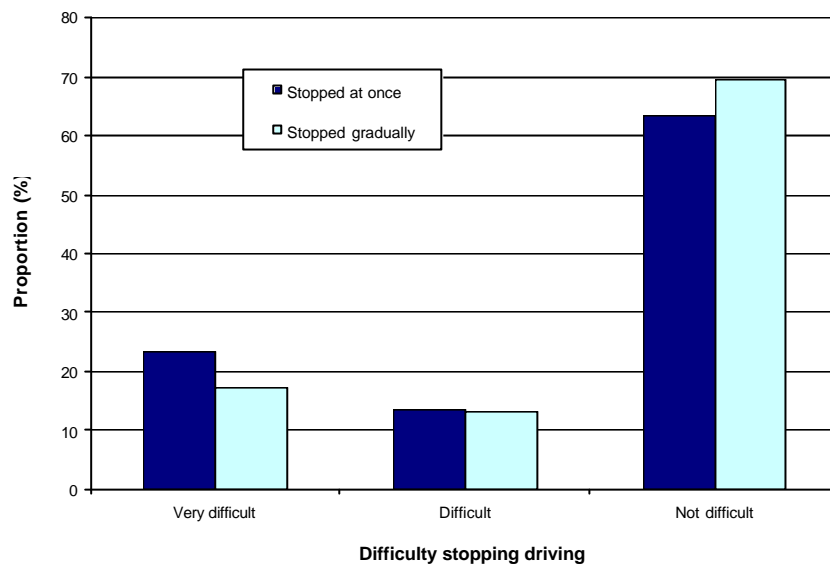


Figure 31: Difficulty stopping driving by process of stopping driving.

Further, as shown in Figure 32, over one-third of the sample did not think at all about the possibility of not driving one day whilst they were still driving and only 21 percent thought a lot about it. In addition, 12 percent consciously tried not to think about it.

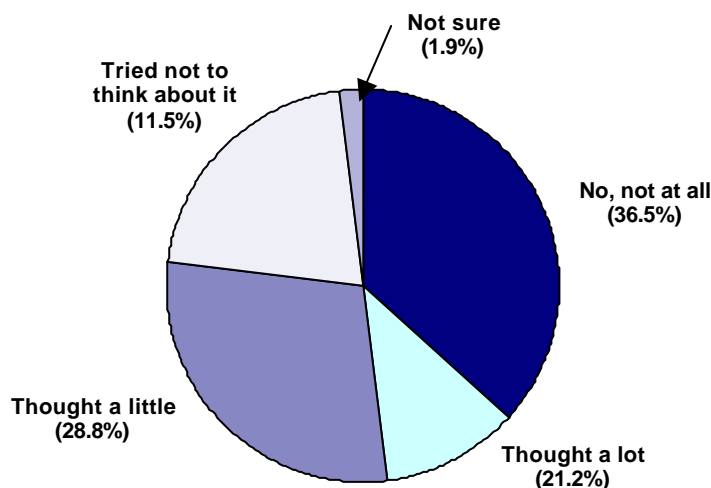


Figure 32: Frequency of thinking about the possibility of not driving one day whilst still driving.

Likewise, few participants indicated that they had made plans for the possibility of not driving one day (see Table 15). The majority (63.4%) reported that they made no plans at all, while only between 5 and 19 percent indicated that they made particular plans including moving closer to family, friends, services and public transport, talking about it with their doctor and sharing the driving. Interestingly, a high proportion did indicate that they became familiar with public transport options.

Table 15: Plans for the possibility of not driving one day

	Proportion (%)	
	Yes	No
Moved house to be closer to alternative transport	11.6	88.4
Became familiar with public transport	58.7	41.3
Explored other travel options	17.9	82.1
Moved near family, friends, social network	10.3	89.7
Moved near services used	18.6	81.4
Talked about it / got advice from doctor	15.8	84.2
Shared the driving	5.4	94.6
Changed type of holiday plan	12.5	87.5
No changes or plans made while still driving	63.4	36.6

The majority of participants (84%) indicated that they made the final decision themselves to stop driving, while six percent made this decision together with family or friends. Very few indicated that others made the decision for them, and of these, most indicated that it was their doctor that made this decision. In addition, few (nine, or 17.3% of the sample) indicated that someone suggested to them that they should limit or stop driving while they were still driving. This suggestion was generally made by family members such as son, daughter, son-in-law or daughter-in-law (28%), and medical professionals such as eye doctor (22%), GP (22%). Two participants also reported that a friend had suggested they limit or stop driving and one participant reported that her partner had raised this issue with her.

Participants were asked to describe how they felt about this suggestion. In general, participants were accepting of these suggestions, however, responses also indicated that it was a difficult time for them. Some of the reported feelings at this time included:

“Concerned but relieved.”

“Shattered.”

“For safety reasons, thought it was right time to stop.”

“It was suggested the trauma I could suffer if involved in an accident and I was aware of the problem I would be for my family.”

“.....the time had come.”

“.....GP said he would be unhappy if his children were playing on the road and I drove by. This seemed a very valid comment and I never drove again!”

Participants were asked to indicate the main reasons that may have contributed to them stopping driving. As shown in Table 16, the most common reasons given included availability of alternative transport options, decreased confidence in driving skills and ability to handle driving situations, and discomfort when driving.

Table 16: Main contributing reasons to stopping driving.

Reasons	Proportion
Alternative transport available	59.5
Decreased confidence in driving skills	55.9
Someone else available to drive	48.6
Not comfortable while driving	48.4
High cost of running a car	47.4
Decreased confidence in traffic situations	45.5
No longer enjoyed driving	39.4
Major health or medical reasons	33.3
Experienced physical problems	30.3
Concern about licence testing	18.8
Doctor or others advised not to drive	18.2
Retired from work and did not need to drive	18.2
A crash or ‘close call’	17.6
Licence not renewed	12.5

Note: Multiple response question – total may exceed 100%

Given that a substantial proportion indicated that decreased confidence in traffic situations was a major contributing factor in their decision to stop driving, it is interesting to note what situations were a problem for participants while they were driving. Not surprisingly, the most common problem driving situations were driving at night or in poor weather conditions, driving on busy roads and driving on unfamiliar roads. Less common problems were the type of car, and other issues such as getting lost or car breaking down (see Figure 33).

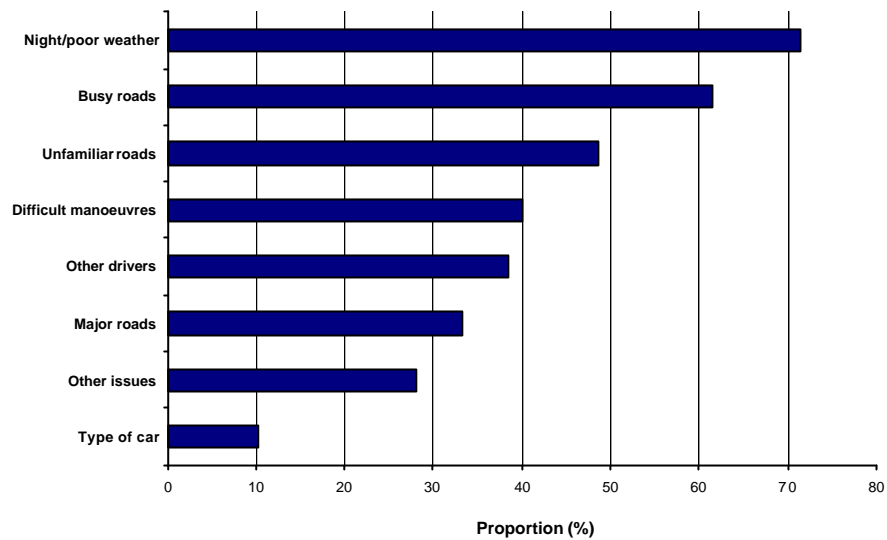


Figure 33: Driving situations that were a problem prior to stopping driving.

Around one-third of former drivers indicated that others relied on them for transportation. This was generally transporting family (children, grandchildren and partners), friends, and driving others to social outings such as bowling. Interestingly, an association was found between others relying on drivers for transportation and difficulty making the decision to stop driving. Those who were responsible for transporting others were more likely to have difficulty stopping driving than those that did not have others relying on them for transportation, $\chi^2_{(2)}=9.81$, $p=0.007$ (see Figure 34).

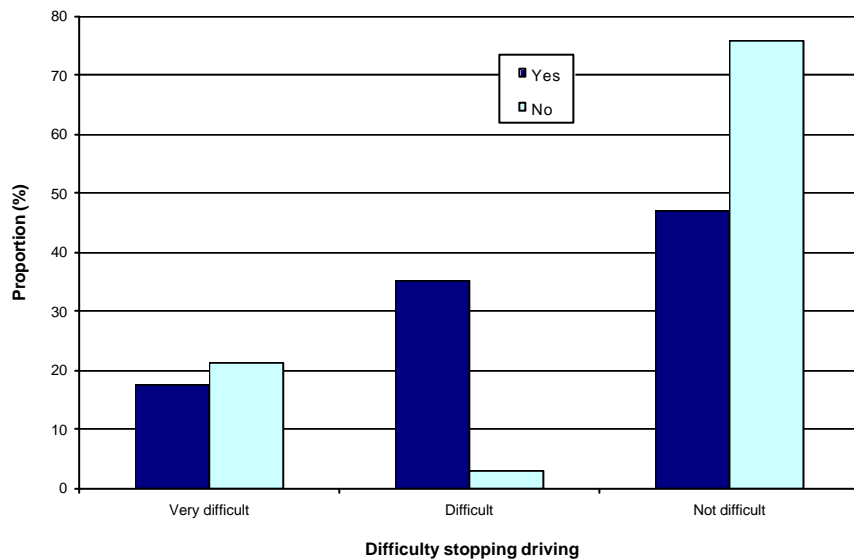


Figure 34: Responsibility for transporting others by difficulty stopping driving.

In addition, there was some suggestion that feelings about driving were associated with responsibility for transporting others. Those who were responsible for transporting others were more likely to indicate that they enjoyed driving or that driving was just something they had to do, while those that did not have others that relied on them for transportation

were more likely to indicate that they either did not like driving in the end, or never liked driving that much, $p=0.07$.

In response to the question, ‘what did ceasing driving mean to you?’, there was a wide range of responses. Broadly, responses focussed on loss of independence, freedom and quality of life and dependence on others for transportation (29.1%), difficulty and inconvenience in getting to places including social outings and shopping (20.0%), sadness and depression (9.1%), and requirement to change lifestyle, particularly to take into account time needed to catch public transport (10.9%). There were positive responses also. One-quarter of participants were not worried about giving up driving and felt comfortable with the decision, and others (5.5%) indicated that it was a relief not to be driving any more. Some of the responses included:

“Frustration at inability to go where I wanted and when I wanted.”

“I had to re-evaluate my lifestyle.”

“It took away my confidence, not able to do my own shopping and social outings stopped. Now live a confined life within my home and garden. Felt I have lost at least 10 years of my happy outlook.”

“Lack of bowls and its sociability. More dependence on others for transport. Frustrations in extreme!”

“Not driving has stopped me from doing things I really like to do, it also causes a great dependency on public transport.”

“Restricted shopping and the trips required greater organisation. Far less going out and less community work. Greater sadness and depression.”

“Was happy for my husband to do all the driving. Sold my car.”

“I felt comfortable with my decision.”

The literature points to the issue of premature cessation of driving amongst older women. Participants were asked about the timing of their decision to stop driving. While 58 percent of the sample indicated that they thought they had stopped driving at about the right time, over one-third (34%) felt that they had stopped too early. Only two percent felt that they had made this decision too late, while six percent were unsure. There was an effect of presence of other driver in the household associated with the timing of stopping driving, $\chi^2_{(6)}=12.33$, $p=0.055$. As shown in Figure 35, those that had other drivers in the household available were more likely to indicate that they had stopped driving earlier than they should have, compared to those who were the only driver in the household.

In addition, those who were the sole driver in the household were more likely to indicate that they had stopped about the right time than those with other drivers available. There was also some suggestion that timing of driving cessation was associated with satisfaction with current mobility. Compared with women who thought they had stopped driving at the right time, slightly more women who thought they had ceased driving too early indicated some dissatisfaction with current mobility, $\chi^2_{(3)}=6.93$, $p=0.074$.

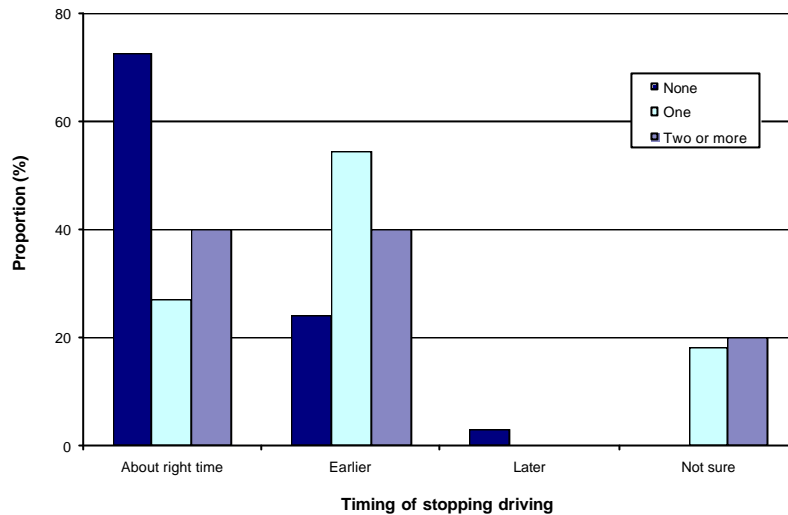


Figure 35: Timing of stopping driving by presence of other drivers in household.

Last, former drivers were asked some questions on driving in the future. The majority (79.2%) indicated that they believed that they would not drive again, while 13.2 percent said that it is possible that they might drive again. No participants indicated that they would definitely drive again in the future. There was some association between possibility of driving in the future and timing of stopping driving, $\chi^2_{(6)}=11.11$, $p=0.085$. Those that indicated that they would not drive at all in the future were more likely to have stopped driving at about the right time. In contrast, those who thought that they could possibly drive again in the future or were not sure of driving in the future were more likely to have stopped driving earlier than they should have or indicated that they were not sure of the timing of stopping driving.

Participants were asked to indicate how easy or difficult it would be to start driving again. Figure 36 shows ease in starting driving again by possibility of driving in the future.

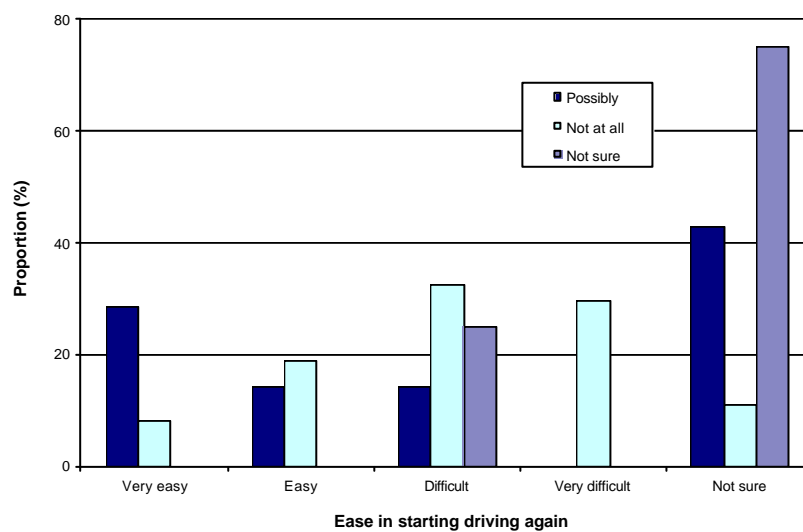


Figure 36: Ease in starting driving again by possibility of driving in the future.

Generally, participants indicated they would have some difficulty driving again, with 22.9 percent indicating it would be very difficult and 29.2 percent indicating it would be difficult. Only 10.4 percent felt it would be very easy, while 20.8 percent were not sure. Two factors were associated with this response: belief that they might drive in the future, $\chi^2_{(8)}=16.63$, $p=0.034$, and reported difficulty making the decision to stop driving, $\chi^2_{(8)}=16.17$, $p=0.040$. Figure 36 shows ease in starting driving again by possibility of driving in the future.

Not surprisingly, participants who indicated that they would find it easy to start driving in the future were more likely to indicate that they may possibly drive again in the future. In contrast, those who thought it would be difficult or very difficult to start driving again also believed that they would not drive again in the future.

3.2.3.3 Mobility

The last section of this questionnaire addressed some issues about mobility, transportation needs and use of alternative transport options. Participants were asked to indicate how many days a week they typically went out. The majority of participants went out either daily or three to four times a week (68.7%) and very few went out once a month or less. Interestingly, almost one-fifth (19.6%) indicated that they only went out a few times a month. Figure 37 shows a comparison between the frequency of travel of former drivers and current drivers and demonstrates a clear difference in mobility. Current drivers were much more likely to travel on a daily basis than former drivers.

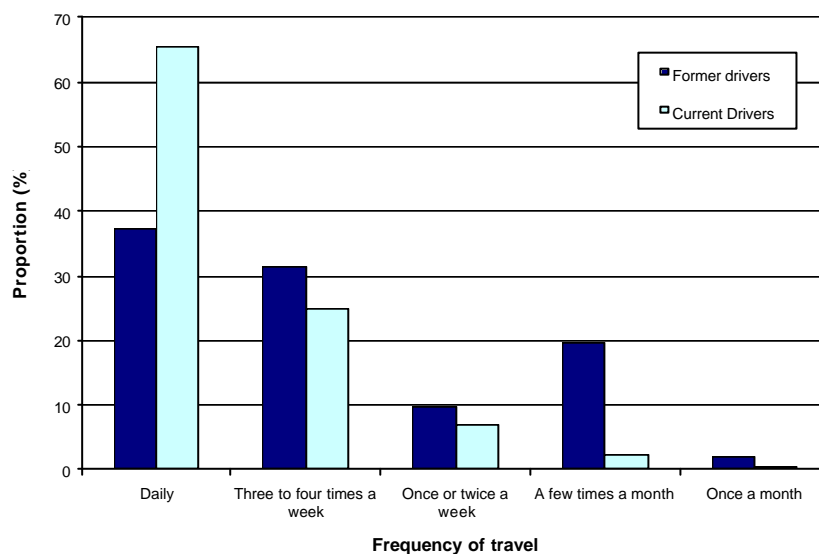


Figure 37: Frequency of travel by current and former drivers.

Participants were also asked to indicate whether they were satisfied with their current ability to get to places. Generally, participants were satisfied with their mobility, with 86 percent indicating satisfaction. There was some suggestion that this was associated with frequency of travel, $\chi^2_{(4)}=8.25$, $p=0.083$. Overall, those that travelled frequently (daily) were more likely to indicate that they were satisfied with their ability to get to places. In contrast, those that travelled less frequently (less than three to four times a week) were more likely to indicate that they were unsatisfied with their current mobility. Interestingly, those that travelled a few times a month indicated satisfaction with their current mobility.

Participants were asked to indicate if they had any difficulty with transportation to undertake activities. Table 17 provides a summary of reported difficulties with transportation.

Generally, participants indicated that transportation to all of these activities did not cause many problems for them. This was particularly so for essential trips such as shopping and going to appointments, where approximately 12 percent of participants only indicated that this was a problem for them. Transportation for more ‘non-essential’ activities such as visiting family and friends, undertaking social activities and attending sporting activities was more likely to be a problem, with higher proportions of participants indicating that they experienced problems (26.7%, 22.7% and 20.4%, respectively). Interestingly, these responses were clearly associated with satisfaction with the ability to get to places. Of those who indicated that they had difficulties with all of these activities, the vast majority were also dissatisfied with their mobility. In contrast, those who reported no difficulties with transportation to these activities were generally more satisfied with their current mobility.

Table 17: Reported difficulties with transportation by satisfaction with ability to get to places.

		Overall (%)	Satisfaction with mobility (%)		p-value
			Yes	No	
Difficulty going to shops	Yes	12.0	7.1	92.9	=0.008
	No	88.0	42.9	57.1	
Difficulty going to appointments	Yes	12.5	4.9	95.1	< 0.001
	No	87.5	66.7	33.3	
Difficulty accessing community services	Yes	15.6	7.9	92.1	< 0.001
	No	84.4	66.7	33.3	
Difficulty accessing health services	Yes	20.4	12.2	87.8	< 0.001
	No	79.6	71.4	28.6	
Difficulty attending social sport activities	Yes	18.2	11.5	88.5	= 0.030
	No	81.8	50.0	50.0	
Difficulty visiting family or friends	Yes	26.7	15.8	84.2	< 0.001
	No	73.3	100	0	
Difficulty undertaking other social activities	Yes	22.7	13.9	86.1	= 0.001
	No	77.3	71.4	28.6	

Some questions were related to alternative transport options. Participants were first asked about the types of transportation that are available to them and, of those available, how often they used them (Figure 38). The most commonly available means of transport for this

group were riding as a passenger in a car with family or friends, public transport, taxi, and walking. Approximately 45 percent indicated that riding as a passenger in a car with their partner was an available transport option. Only between 10 and 15 percent of participants indicated that motorised scooters, bicycles and riding with a paid assistant were available to them.

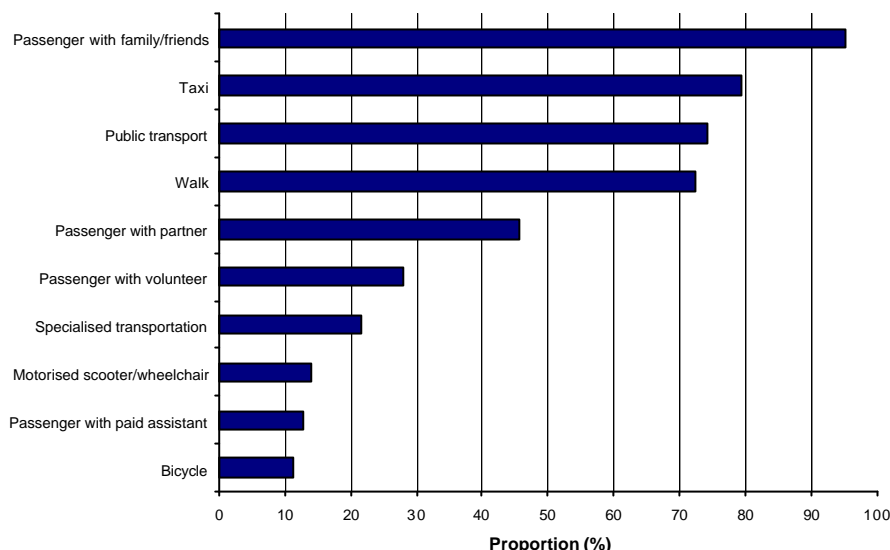


Figure 38: Alternative transportation options available to participants.

Given the availability of these transport options, participants were asked if they used these forms of transport. These responses are summarised in Table 18.

Table 18: Frequency of use of alternative transportation options.

	Use of transportation option (%)			
	Often	Some-times	Rarely	Never
Ride as passenger with family/friends	35.3	64.7	0	0
Taxi	24.0	52.0	24.0	0
Public transport	68.0	24.0	4.0	4.0
Walk	76.0	20.0	4.0	0
Ride as passenger with partner	50.0	50.0	0	0
Ride as passenger with volunteer	0	71.4	14.3	14.3
Specialised transportation	0	66.7	16.7	16.7
Motorised scooter	80.0	20.0	0	0
Ride as passenger with paid assistant	0	33.3	33.3	33.3
Bicycle	100.0	0	0	0

Generally, if transportation options were available, participants used them either often or sometimes. Large proportions of participants reported using public transportation and walking often if they were available to them.

3.2.3.4 Crash Involvement

Last, former drivers were asked if they had been involved in a crash or incurred any traffic infringements (other than parking fines) during the last five years of driving. Seven participants (12.7% of the sample) reported that they had been involved in a crash and none reported having incurred any infringements.

Given the low numbers of crash-involved participants, few associations with other factors were found, however, analyses revealed an effect of possibility of driving in the future. No crash-involved participant indicated that they would drive again in the future, however, those who had not been involved in a crash indicated that it was possible that they would drive again in the future, $\chi^2_{(2)}=17.78$, $p<0.001$. In addition, there was some suggestion that principal driver status was associated with crash involvement, $\chi^2_{(1)}=3.14$, $p=0.077$. As shown in Figure 39, a greater proportion of crash-involved participants were not the principal driver in the household. In contrast, those who were the principal driver were more likely to have not been involved in a crash in the last 5 years of driving.

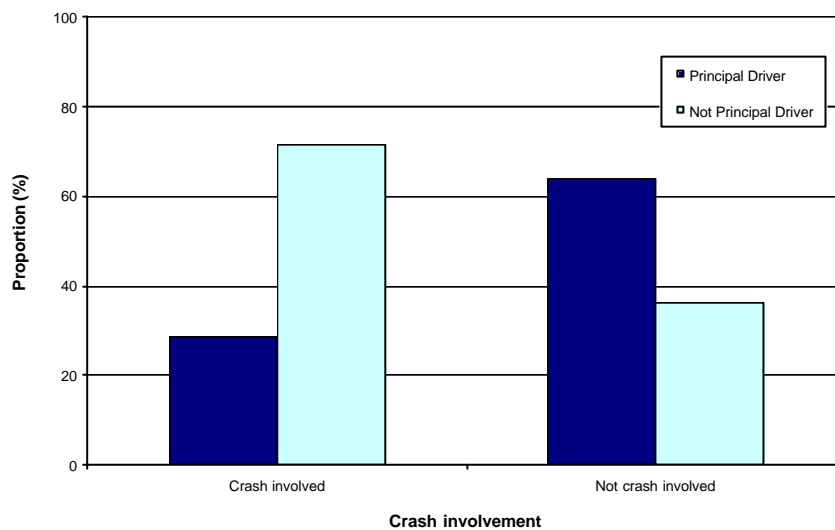


Figure 39: Crash involvement by principal driver status.

3.3 SUMMARY

A total of 726 current and former women drivers aged 60 years and over took part in this survey. The majority of these women were married, retired and living independently in suburban areas of the ACT, close to shops and services. The majority also indicated that they were healthy with relatively low proportions reporting health-related problems (although many were taking long-term medication for an ongoing medical condition). Not surprisingly, former drivers were generally older than current drivers, were more likely to be widowed, living alone, living in a retirement home or village and report more health-related problems than current drivers.

The results have provided a rich source of information on many aspects of transportation issues of older women. Of particular interest were the following findings:

- Older women with poorer health status, who were the principal driver but lacked up-to-date experience, who reported being less confident and less positive about driving and who reported problems driving were more likely to have been involved in a crash than younger, healthier women who did less of the driving and who were confident and positive about driving.
- Older women with health problems, who experienced problems with driving situations, did not enjoy driving and had been involved in a crash were less likely to have expectations of longer-term continuation of driving.
- Current drivers expressed negative feelings about driving cessation, however, former drivers were generally more positive about their decision.
- Approximately one-third of the sample felt they stopped driving too early and the presence of another driver affected this decision.

4 DISCUSSION

The relevance of gender to road safety has long been recognised, however, very little research has been directed to the safety and mobility needs of older women. Very little is known about the many issues surrounding the safety and mobility of older women, particularly in terms of changing driving roles, whether men and women differ in driving behaviour, or the role experience and confidence plays in crash risk and the decision to stop driving.

This research has identified many of the issues surrounding crash risk, driving experiences, reduction and cessation of driving and mobility options for older women in the ACT and highlighted a number of potential risk factors, particularly those of lack of driving confidence and up-to-date experience, and the processes involved in retiring from driving at the right time and successfully that need to be considered to ensure the safety and mobility of this group of older drivers.

The crash analysis showed that, in terms of raw numbers, older car occupants in the ACT are at relatively lower risk of crash involvement than younger car occupants, but that older females occupants are at greater risk than older males of being killed in a crash. More importantly, when adjusted for population and licence holder distribution, high rates of fatalities for older drivers compared to younger drivers were found, particularly for older male drivers. Older female drivers were over-represented in serious injury outcomes. These findings support previous Australian and international studies reporting an over-involvement in injury crashes amongst older women (Massie et al., 1995; Finison & Dubrow, 2002; ATSB, 1996).

The survey of older women in the ACT provided some expected and interesting findings on which to formulate some countermeasures aimed to improve crash risk, driving experiences, and driving choices and these are discussed in the following sections. First, the travel patterns of current and former drivers are discussed. Following this, the three main areas of concern for older women driver safety that have been identified here are discussed, taking into account the findings from the survey and previous literature. First, the factors that are associated with increased crash risk are discussed. Second, the issues associated with driving experience and confidence are presented and discussed. Third, the findings on processes and consequences of driving reduction and cessation are presented and discussed, particularly mobility consequences and availability and use of alternative transport options.

A number of recommendations are made. Recommendations for the contents of a comprehensive educational resource for older women in the ACT are made. These address the issues of importance that are highlighted through this research. Recommendations for further research to follow up on some of the issue raised through this study are also made.

4.1 TRAVEL PATTERNS AND MOBILITY

The majority of women in this study drove daily, with many indicating that they travelled between 21 and 100 km per week, but this decreased as age increased, with more older women driving only three to four times a week. This finding was not unexpected and confirms that found in a previous study (Charlton et al., 2003). Other studies have found similar results, and also show that women in general, and particularly older women, drive fewer kilometres than men in similar age groups (Sirén et al., 2001; Rosenbloom, 1999).

As expected, the majority of trips by this sample of women were for shopping, appointments, access to community services and social activities including visiting family and friends. Many participants also indicated that other forms of transport were available to them and some of these were used fairly frequently. Of most interest is the finding that many women rode as a passenger with their partner, family or friends. Related to this is the finding that many women often drove alone, however, this also seemed to be related to marital status and the presence of a partner to drive. Those who had someone else to drive (usually a partner) were less likely than older widowed drivers to drive alone. Other studies have reported that these factors also explain the lower kilometres driven by females compared to males, particularly alternative transport options and the availability of another driver (Sirén et al., 2003).

Overall, these data suggest that the sample of current drivers was a fairly active and independent group, driving frequently and considerable distances each week, and often driving alone. However, as expected, the amount and frequency of travelling decreased as age increased, while the likelihood of driving alone increased as age increased.

Former drivers, too, were a fairly active group, albeit considerably less mobile than current drivers. Over two-thirds went out either daily or three to four times a week, however, almost one-fifth indicated they only went out a few times a month. While the majority of them were satisfied with their mobility, it was clearly those who went out daily who were the most satisfied. Those who travelled less frequently were more likely to be dissatisfied with their mobility. Moreover, these women also indicated experiencing difficulty with transportation to undertake activities, particularly 'non-essential' activities such as social outings, and visiting family and friends. The most common forms of alternative transport used included riding as a passenger with family or friends, using public transport or taxi and walking. Less than half rode as a passenger with their partner.

4.2 CRASH RISK

Analyses presented in this study showed that the absolute numbers of older driver crashes in the ACT is relatively small, compared with younger driver crashes. However, adjustment of figures for licensure rates and population distribution demonstrated the over-involvement of older drivers in fatal and serious injury crashes. The statistics also show that, per licensed driver, older females are over-represented in fatal and serious injury crashes compared to younger male and female drivers. Further, compared with older male drivers, older women drivers are over-represented in serious injury crashes.

As indicated previously, the causes of older driver crashes are certainly complex and poorly understood. A range of factors have been discussed in the literature to explain older driver over-involvement in fatal and serious injury crashes. These include increased physical vulnerability, age-related changes in functional performance and inappropriate risk perception. For older women, there appear to be additional factors that heighten their vulnerability to crash and injury risk.

Approximately 12 percent of current and former drivers reported having been involved in a crash in the last five years. The results of this survey demonstrate that there are a number of travel, driving and health factors that contributed to crash risk of this sample of older women drivers. Women who drove more often and longer distances were more likely to have been involved in a crash than women who drove less. These findings may purely be an artefact of increased exposure – those who drive more are exposed for longer periods of

time to the risk of crashes. While these findings are intuitive, it should be noted that some authors have suggested that the relationship between travel distance and crash rates is not linear and that drivers travelling more kilometres demonstrate reduced crash rates per kilometre than those driving fewer kilometres (Hakamies-Blomqvist, 1998; Maycock, 1997). Notwithstanding the question about the influence of exposure, it is clear that other factors may play some role here, for example, driving style, and when and where older women drive. Indeed, the finding that lack of confidence of being a safe driver among this sample of women was also associated with crash involvement suggests that it is not solely an exposure issue. These issues are discussed in the following sections.

4.3 DRIVING EXPERIENCE

One of the issues noted in the literature is maintenance of up-to-date driving experience and shared driving. Among today's older couples, the male partner is generally the principal driver when couples travel together. However, if and when the male partner is unable to drive, it is often left to the female partner to take on this role. This may be a stressful experience for many older women who do not have up-to-date experience and the confidence to drive. Furthermore, the literature points to an increased risk of crash involvement associated with a lack of experience (McKnight, 1997; Massie et al., 1995). The findings of this research lend support to this contention. Interestingly, the majority of women in this sample did most of the driving. However, this was clearly associated with marital status and presence of another driver in the household. The great majority of women who were married and had another driver available were not the principal driver. In contrast, those who were widowed and did not have another driver available were more likely to report being the principal driver.

One way to maintain driving experience is to share the driving as much as possible, however, there are many reports that older women are unlikely to do so if they have a partner available to drive (Cedersund, 1990). In contrast to previous studies, close to 60 percent of women in this study indicated that they shared the driving, however, this was only on long-distance trips and predominantly among younger women. It would be worth examining the circumstances of where and when driving is shared to gain a better understanding of this issue. It may be that men undertake most of the driving on shorter trips and in more difficult or demanding driving situations such as urban driving.

As noted previously, of most interest is the finding that current drivers who considered themselves to be the principal driver were more likely to have been involved in a crash in the last five years than those who were not the principal driver. While this may be due, primarily, to greater exposure (more frequent trips), it may also be due, in part, to a lack of up-to-date driving experience when a partner or other driver in the household is available. It may be reasonable to assume that those who are now the principal driver (who are generally widowed or do not have another driver in the household) were not the principal driver in the past when they were married and had another available driver. This would mean that, on becoming the principal driver, they may have experienced problems gaining that experience and confidence again. This issue requires more research to explore these hypotheses further.

Surprisingly, there was some inconsistency between the crash experience of current and former drivers in this study who considered themselves the principal driver. Current drivers who were the principal driver were more likely to have had a crash than those who considered themselves to not be the principal driver. For former drivers, the reverse was

true. The sample of former drivers, particularly crash-involved former drivers, was very small and the results should, however, be treated with caution and further investigation of these issues is warranted.

4.4 CONFIDENCE AND FEELINGS ABOUT DRIVING

Confidence and feelings about driving are thought to affect driving behaviour and crash risk and the literature points to a lack of confidence and less positive feelings towards driving among women drivers compared to male drivers (Parker et al., 2003; Charlton et al., 2003; Hakamies-Blomqvist & Wählstrom, 1998). The findings from this study suggest that confidence plays some role in crash risk and driving experiences of older women in the ACT and that there are complex relationships between confidence, principal driver status, availability of another driver, health-related factors and feelings about driving.

Current drivers were generally confidently safe drivers, they experienced few recent changes in the amount they drove and in their confidence in being a safe driver, and reported few problems with driving situations. However, over one-third of current drivers indicated moderate or low levels of confidence in being a safe driver. Moreover, some differences within the sample were apparent. Age differences, change in amount of driving in the last five years, and driving situations that caused problems were associated with confidence levels. Older drivers were more likely than younger drivers to report lower confidence of being a safe driver and an increase in driving situations that caused them problems such as other drivers, unfamiliar roads and driving at night or in poor weather conditions. In addition, those who indicated that their driving had decreased over the past five years and that they had experienced some change in their confidence compared to five years ago were more likely to indicate lower confidence in their ability to drive safely.

As noted previously, principal drivers were more likely to be confident of being a safe driver than those who were not the principal driver. In addition, poorer health status and vision problems were associated with lower confidence levels. Drivers with reported health problems (overall health status, vision problems and ongoing medical conditions) were also more likely than those with fewer health problems to report a reduction in confidence in being a safe driver, particularly compared to five years ago, to have reduced their driving compared to five years ago, and report experiencing problems in many of the listed driving situations.

Not unexpectedly, confidence was also clearly associated with problems in certain driving situations and these findings support previous reports of an association between low confidence, difficulty and avoidance of particular driving situations (Charlton et al., 2003). Those who were less confident of being a safe driver experienced problems on major and busy roads, with other aggressive drivers, performing difficult driving manoeuvres, driving on unfamiliar roads and driving at night and in poor weather conditions. Related to this were the associations between reported feelings about driving and problems in driving situations. Almost one-quarter of participants indicated that they never liked driving and close to 12 percent said their feelings about driving had changed negatively (generally older participants). Those who reported less positive feelings about driving were more likely to also report problems in all driving situations listed. This was not surprising, given that feelings about driving and confidence of being a safe driver were also associated.

It is also reported in the literature that some older drivers like to have a passenger to assist with driving. Burkhardt et al. (1998) noted that non-driving partners, usually women, are

known to assist their driving partner who may have a physical or cognitive limitation that disrupts driving. The findings of this study, however, did not provide strong support for this, with only a very small proportion indicating that they preferred a passenger. Despite this, the findings did suggest that confidence of being a safe driver was associated with the desire to have a passenger, with those who are less confident more likely to want a passenger either for company or to assist in driving.

Former drivers, too, generally enjoyed driving, however, this was mainly among those who considered themselves the principal driver when they were driving. Further, a substantial proportion also indicated that these feelings had changed just before they stopped driving. Their responses focussed on loss of confidence, health-related reasons and responsibility.

4.5 DRIVING REDUCTION AND CESSATION

There are many reports that older drivers rely heavily on driving for most of their transportation needs, they are strongly interested in continuing to drive and that making the decision to reduce and eventually stop driving is an extremely difficult process for many older drivers (OECD, 2001; Transportation Research Board, 1988; Oxley & Fildes, 2000). There are also a number of reports that suggest that there are gender differences involved in this process and that women are more likely than their male counterparts to reduce and stop driving at an earlier age and perhaps, for some, prematurely (Charlton et al., 2003; Gallo et al., 1999; West et al., 2003; Hakamies-Blomqvist & Sirén, 2003; Stutts et al., 1999; Stutts et al., 2001).

In general, driving reduction was perceived as a negative life event, with most current drivers believing that they would keep driving for a number of years to come. Most of this group enjoyed driving and were strongly interested in keeping driving for as long as possible, particularly those who experienced few or no problems in driving situations, those who drove frequently and were the principal driver, and those who were confident they were a safe driver. Moreover, current drivers raised some concerns about no longer being able to drive, particularly in terms of loss of independence, decreased ability to do important things such as shopping, visiting family and friends, transporting others and attending social functions.

Further, almost two-thirds of current drivers indicated that they would keep driving for at least another five years or more. Not surprisingly, there were some effects here including health-related problems, amount of driving, principal driver status and confidence level. Healthier and confident drivers who drove substantial distances and did not have another driver in the household expected to keep driving for longer than drivers with poorer health status, vision problems, ongoing medical conditions, who lacked confidence, drove shorter distances and had another driver available in the household.

Only one-fifth of drivers had reduced the amount of driving they did in the last five years, and most had done this gradually. Even though much of the literature discusses driving reduction in terms of a conscious effort to compensate for age-related changes (Rumar, 1986; Winter, 1988; Eberhard, 1996; Smiley, 1999) and that women are more likely than men to self-regulate their driving (Burkhardt et al., 1998; Hu et al., 1998; Charlton et al., 2003), the majority of this group reported that they had reduced driving for other lifestyle reasons and many simply due to a reduced need to drive. There were, however, some who reduced their driving for other reasons related to increased discomfort or loss of confidence, decreased enjoyment and decreased feelings of safety. A small proportion of

drivers had increased their driving and this was due to the need to transport others, and lifestyle choices.

Most of this group had not thought much about driving cessation and very few drivers had someone suggest to them that they limit or stop driving, however, this was mainly among the younger and healthier drivers in the group. Older drivers and those with poorer self-reported health status had thought at least a little about this event. Encouragingly, however, there was a substantial proportion of drivers who indicated that they had made some plans for no driving in the future. Again, there was an age effect here, with older drivers most likely to have made some plans for this event.

In contrast to the findings for current drivers, the findings regarding driving cessation among former drivers were encouraging and indicated that the majority retired from driving successfully and were satisfied with their decision. This was apparent, even though former drivers, like current drivers, did not think much about the possibility of not driving whilst they were still driving, very few had made plans and a substantial proportion expressed negative feelings at the time of stopping driving including loss of independence, freedom and quality of life, sadness and dependence on others, however, there were some positive attitudes and comfort in the decision.

Most women stopped all at once and two-thirds indicated that they did not experience any difficulty making this decision, albeit with some indication that those who had stopped suddenly finding it a more difficult decision than those who stopped gradually. In addition, it appeared that those who were responsible for transporting others experienced more difficulty making the decision to stop driving than those who did not have others relying on them for transportation.

This finding may, in part, be due to the fact that many made the final decision themselves. Very few indicated that others had made this decision for them. Of these participants, there were mixed responses regarding how they felt at the time. Many were accepting of the suggestion, however, responses also indicated that it was a difficult time for them.

A range of reasons that may have contributed to stopping driving was listed and many of the responses centred around discomfort and decreased confidence while driving and handling driving situations. Interestingly, these responses were somewhat different than those reported by current drivers when asked reasons they might consider limiting or stopping driving. Current drivers were more likely than former driver to indicate experiencing a crash or 'close call', health-related reasons, advice from others (doctor, family or friends), and concern about licence testing as reasons they might consider stopping driving. Former drivers were less likely to give these reasons, but indicated that the availability of other transport including someone else to drive, lack of driving enjoyment, decreased confidence and the high cost of running a car were also reasons they stopped driving.

Finally, while many former drivers felt they had chosen the right time to stop driving, over one-third felt they had stopped too early. Many of these women had another driver in the household and there was some indication that they were more dissatisfied with current mobility than those who felt they had chosen the right time to stop driving. In addition, while the majority of women believed they would never drive again, there were some who thought it was possible they would drive again. These were mainly women who indicated that they had stopped too early, who had not been involved in a crash. Of some concern

was the finding that these women generally thought they would have some difficulty driving again.

4.6 RECOMMENDATIONS AND FURTHER RESEARCH

This research has provided valuable information on which effective countermeasure programs can be built, particularly how to target older female driver groups in road safety initiatives in the ACT, and therefore will play a major role in reducing the incidence and severity of crashes involving older road users.

Meeting and supporting the mobility and safety needs of older women drivers in the future will require a comprehensive strategy, one which includes awareness and education initiatives, improving vehicle design and ensuring a safe and comfortable road environment in which to drive. Programs aimed to raise the awareness of safety and promote the adoption of safe behaviour among the older community, are essential components of the strategy. The findings from this research have guided the formulation of a number of recommendations for educational resources for older women. The emphasis of educational packages should be to raise awareness among and educate older women about crash and injury risk, travel needs and on the benefits of gaining up-to-date experience and confidence to keep driving safely for as long as possible and raise the awareness of the potential mobility consequences of premature driving cessation.

The recommendations for the contents of an educational resource are as follows:

- **Introduction:** Crash and injury risk. This section should contain general information about the increased risk of crash and injury with increasing age, with emphasis on the fact that older women's crash and injury risk will increase in the years ahead because of population, licensing and travel pattern changes.
- **Mobility Issues:** The benefits of safe driving. This section should contain information on the mobility benefits of driving safely for as long as possible.
- **Risk Factors:** What places older women at higher risk of crash involvement and injury outcomes. This section should contain information on the factors that heighten the risk of crashing and sustaining a severe injury for both older drivers in general, but also the specific risk factors for older women. It should contain information on:
 - Health and age-related functional performance factors that can increase crash risk
 - Physical frailty factors that can increase injury risk
 - The consequences of lack of up-to-date experience on crash risk
 - The consequences of lack of confidence on crash risk
 - Travel patterns and avoidance of difficult driving situations
- **Safe Practices:** Hints on how to keep driving safely for as long as possible. This section should contain information on safe driving practices, recognition of risk

factors and planning reduction and cessation of driving successfully. It should contain the following information:

- Recognising the signs that driving skills are good enough to continue driving including a checklist and information on signs that indicate it might be time to reduce or stop driving, being aware of the effect of medications on driving skills, and planning trips accordingly.
- Information on ways to maintain up-to-date driving experience such as sharing the driving with partner or family/friends, driving as much as possible in safe and familiar areas, and undertaking a driver training course.
- Information on ways to increase or maintain confidence levels while driving such as driving as much as possible in safe and familiar areas, undertaking a driver training course, buying a car that is comfortable and easy to manage and has safety features, changing driving patterns to avoid stressful driving situations, planning trips, and driving with a passenger for company and to assist with driving if necessary.
- **Reduction and Cessation of Driving:** The benefits and disbenefits of driving reduction and cessation. This section should contain information on the processes involved in reducing and eventually stopping driving and address the specific issues of excessive driving reduction and premature driving cessation. It should contain information on:
 - Recognising the signs that driving skills are changing and adopting safe strategies including reducing amount of driving, driving in unfamiliar areas, driving in stressful and complex areas, driving in peak hour traffic, driving while tired,
 - Making the decision to reduce and stop driving successfully by talking with family and friends and health professionals, making the decision yourself, planning ahead for not driving,
- **Maintaining Mobility:** Hints on ways to maintain satisfactory mobility without the car including making different lifestyle choices and exploring alternative transport options. This may include suggestions to live close to family, social networks, shops and medical services and public transport, increase walking and become familiar with public transport.

Further Research

While this research has identified many issues of concern regarding older women drivers in the ACT, it has also highlighted some areas requiring further research and issues that require confirmation among a large sample of older drivers.

One of the main difficulties in conducting a survey in one jurisdiction of Australia is the lack of generalisability of the findings. For example, it may be that some of the findings from this survey are unique to the sample group of older women and unique to the experiences of drivers in the ACT. It is, therefore, essential for any findings to be representative of the Australian population as a whole and it would be worthwhile expanding the survey to include a sample from at least one other jurisdiction to strengthen

the findings and recommended countermeasures. Moreover, it would be interesting to investigate the experiences of older drivers, particularly the issues of driving cessation and crash risk between jurisdictions with and without age-based licensing systems in order to make some recommendations regarding the benefits/costs of different licensing systems.

In addition, this survey clearly focussed on the experiences and issues that may be unique to older women drivers and former drivers, but does not provide any comparison with the experiences and issues of older male drivers and former drivers. Again, it would be worthwhile to extend the survey to include a sample of male drivers and former drivers in order to investigate gender comparisons. Moreover, given the small sample of former drivers in this study (n=53), a continuation of the study to include a larger sample of former drivers would provide greater information about the experiences of reduction and driving cessation.

Given that the literature suggests and is supported by the findings of this survey that the travel patterns and process of self-regulation and driving cessation of older women is different to that of older male drivers, it would be worthwhile to investigate in more detail the travel patterns and driving experiences of older drivers. This can be explored in depth by use of a travel diary.

Finally, one of the main issues emerging from this survey is the crash risk and the contributing factors. While some contributing factors are identified in this study, a more comprehensive study of this important issue is warranted. Two methods may be used to investigate this issue in more detail including. First, an in-depth analysis using regression modelling may be conducted, using the existing data from this study, to gain a complete understanding of the relative importance of factors such as reduced driving, lack of confidence, and health-related factors on crash involvement. Second, a case-control study involving follow-up face-to-face interviews and assessments of functional performance (particularly visual, cognitive, physical and attentional functions) among crash-involved and non-crash-involved women drivers would allow a detailed investigation of the functional limitations that may heighten crash risk.

4.7 SUMMARY

The issue of older female drivers is an emerging concern for road safety, particularly as the proportion of older women driving and being seriously injured or killed in a crash is increasing, and that women over the age of 85 years are the fastest growing segment in the Australian population.

This study has examined the road safety of older women in the ACT by identifying the problems experienced by older women, establishing their crash risk and documenting their travel patterns. This information has led to the development of recommendations for an educational resource to address the specific problems of this group of vulnerable road users.

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