



## Older female drivers: An emerging transport safety and mobility issue in Australia

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### ABSTRACT

This paper describes an investigation of safety, mobility and travel patterns in a sample of older women drivers and former drivers aged 60 years and over. Participants provided information on general health and functional abilities, travel and driving patterns, driving experiences and confidence, difficulty with and avoidance of driving situations, self-assessment of driving ability, crash and infringement history, the process and experiences leading up to stopping driving, and satisfaction with current mobility. The sample was a fairly active group, travelling frequently and substantial distances, and generally satisfied with their level of mobility. Current drivers were strongly interested in keeping driving for as long as possible, expressed strong concerns about the prospect of stopping driving and reported little evidence of self-regulation. In contrast, former drivers were less negative about driving cessation and mostly reported successful retirement from driving with few negative mobility consequences. Further, a number of relationships between crash involvement and driving experience, confidence of being a safe driver, and problems in driving situations were found. These findings have added to our understanding of the issues concerning the safety and mobility of older women. Implications for the promotion of safe driving practices are discussed.

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### 1. Introduction

In Australia, as in most other western countries, crash statistics demonstrate gender differences, with males generally over-represented in fatal crashes and females over-represented in injury crashes. However, there are reports that suggest that these trends are changing, with an increasing fatality and serious injury rate among female drivers (Anderson et al., 1993; Attewell, 1998; Australian Transport Safety Board, 1996; New Zealand Land Transport Safety Authority, 2000). For example, Anderson et al. (1993) and Attewell (1998) reported an increase in the number of female drivers killed and hospitalised (those under 30 years and over 70 years) in the mid- to late-nineties and a decrease for men. These trends are apparent despite the fact that there was an overall decrease in the national road toll and that females tend to drive fewer kilometres than males. More recently, Catchpole et al. (2005) found a relative increase in older driver serious injury crashes compared to middle-aged crashes per distance driven, and this was particularly so amongst older female drivers. It also appears that fatality and serious injury rates for older female drivers are increasing at a more rapid rate than ever before in other western countries including New Zealand and the US (LTSA,

2000; Finison and Dubrow, 2002; Li et al., 1996; Massie et al., 1995).

Moreover, predictions of crash risk for future generations of older road users in Australia suggest an overall three-fold increase in fatal crashes involving older drivers, with a greater increase in fatalities for older female drivers compared to older male drivers (an increase of 336% for females and 261% for males) without active intervention (Fildes et al., 2001). Similar predictions have been shown for older drivers in the US (Hu et al., 2000).

It is generally acknowledged that there are issues specific to older female drivers, compared to older male drivers such as differences in travel patterns including distances driven and when and where driving takes place, licensure rates, prevalence of illness and greater physical frailty, and driving confidence and experience. However, little is known about how these factors may affect the driving experience and crash and injury risk of older females in the Australian context. Moreover, it is recognized that there are marked gender differences in the processes of self-regulation and driving cessation, with older women modifying, reducing and voluntarily stopping driving at a younger age and in better health than older men (Charlton et al., 2003; Gallo et al., 1999; Hakamies-Blomqvist and Sirén, 2003; Rosenbloom, 1996, 1999; Stutts et al., 2001; West et al., 2003).

While the issues surrounding the safe mobility of older road users have been at the centre of transportation research for the last few decades and many efforts have been made to increase

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our knowledge of older road users' transportation needs and crash and injury risk, only a modest amount of this research has focused on the specific mobility needs of and risk factors for older female road users. This paper presents the results of a survey among a sample of older women drivers and former drivers in Australia, providing information on their driving experiences and experiences in reducing and stopping driving, their mobility and transportation needs and factors that may increase crash and injury risk.

## 2. Method

This study surveyed 673 current and 53 former female drivers aged 60 years or over. Participants were volunteers, living in the Australian Capital Territory (ACT) and recruited from the Senior Card membership database in the ACT (over 90% of eligible seniors hold a Seniors Card). In order to target a representative sample of the population of older women in the ACT, the selection was stratified according to age group, and analyses revealed that the sample was generally representative of the ACT population in terms of age group and proportion of female licence holders.

### 2.1. Questionnaire

The questionnaire was designed to gather information on the travel patterns and driving practices of older female drivers, transportation needs, driving decisions, experience and confidence, crash history, views about reduction and cessation of driving and satisfaction with alternative transport options and current mobility. Three separate sections of the questionnaire were developed, one for all participants including general questions on demographic characteristics, health status and medical conditions, one for current drivers and one for former drivers. The questionnaires were designed to provide a combination of multiple choice tick-box responses, ranking scales and some open-ended responses.

### 2.2. Recruitment

A total of 2000 questionnaires were mailed to a random sample of older females aged 60 years and over (stratified according to age group) who had ACT Senior Card membership. In total, 839 (42%) surveys were returned, however, only 726 of these were complete and were included in the analyses (a net response rate of 36.3%).

## 3. Results

The findings of the survey are described below. First the overall characteristics of the sample are presented. This is followed by descriptions of driving patterns and experiences, and experiences in reduction and cessation of driving. Last, the contributing factors to crash involvement are presented.

### 3.1. Sample characteristics

Table 1 summarises the demographic characteristics of the sample, by driver status. The majority of current drivers (62%) were aged in their 60s and a greater proportion of former drivers were older, with more than 73% aged 70 years or over, and only 27% aged in their 60s. Further, overall, the majority were married (42%), retired (84%), lived independently in a home or apartment (95%), and almost all lived close (within 5 km) to their local shops and services (75% lived less than 2 km, with 24% living between 2 and 5 km). Current drivers were more likely than former drivers to be married and living in a private home, apartment or unit, while former drivers were more likely to be widowed, living alone or with other family members and living in a retirement home or village.

In addition, most participants rated their overall health status as excellent or very good (58%), with a much smaller proportion indicating their health status was fair or poor (9%). Former drivers were more likely than current drivers to report lower health status,  $\chi^2_{(4)} = 96.3, p < 0.001$ , and other health-related problems including vision problems (58% vs. 29%), ongoing medical conditions (53% vs. 40%), difficulty with daily living tasks (39% vs. 11%), and taking long-term prescribed medications for an ongoing medical condition (84% vs. 66%).

### 3.2. Driving experiences

Participants were asked to indicate how long they had been driving for (e.g., 5 years or less, 6–10 years, 11–20 years, 21–30 years, or more than 30 years). The majority (90%) of current and former drivers were experienced drivers, and had been driving for over 30 years. Current drivers drove frequently and travelled substantial distances each week, with most travelling between 21 and 100 km per week (Fig. 1). Younger drivers tended to drive longer distances than older drivers,  $\chi^2_{(18)} = 29.65, p < 0.05$ . The most commonly reported destinations were shopping, visiting family and friends, and social activities. Participants also drove to reach appoint-

**Table 1**  
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)
Age group			
60–69 years	61.6	26.6	58.9
70–79 years	33.4	39.4	33.9
80+ years	5.0	34.0	7.2
Marital status			
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
Type of housing			
Home/apartment	95.8	86.3	95.1
Retirement village	3.1	13.7	3.9
Other	1.1	0.0	1.0
Living arrangement			
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

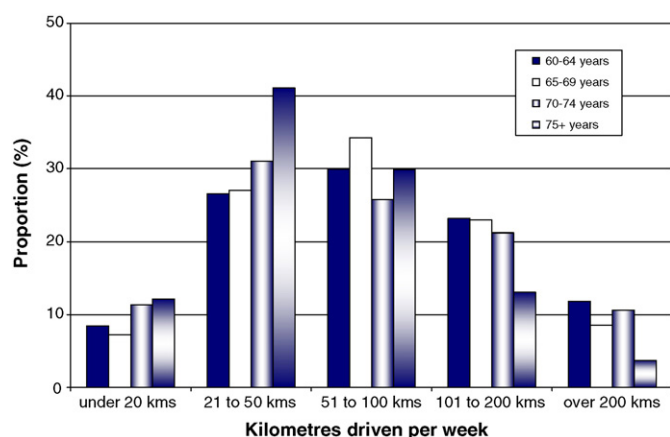


Fig. 1. Kilometres driven per week by age group of current drivers.

ments, access health and community services and to transport others.

Interestingly, 70% of current drivers indicated that they were the principal driver in their household, even though almost half indicated that there were one or more other available drivers in the household. Of those who reported that they were the principal driver, 78% indicated that they were widowed, divorced, never married or separated, and 74% also indicated that they did not have another driver in the household. Of those who indicated that they were not the principal driver, the majority also indicated that they had at least one other driver in the household (98%) and were married or in a defacto (common law) relationship (94%). Not surprisingly, 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,  $\chi^2_{(10)} = 446.23, p < 0.001$ .

Further, the majority of current drivers (87%) indicated that they frequently or always drove alone. Older, widowed drivers were more likely than younger married drivers to indicate that they always drove alone, age:  $\chi^2_{(12)} = 25.22, p < 0.05$ , marital status:  $\chi^2_{(20)} = 202.98, p < 0.001$ . When questioned about long-distance driving in particular, 60% of drivers reported that they shared the driving on long trips.

Current 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 (70%) were very confident that they were safe drivers. These were generally principal drivers,  $\chi^2_{(3)} = 9.17, p < 0.05$ , drivers who did not prefer to have a passenger,  $\chi^2_{(15)} = 25.65, p < 0.05$ , and younger drivers (although this failed to reach statistical significance,  $p = 0.55$ ).

Interestingly, most current drivers (83%) indicated that the amount they drove had not changed over the past 5 years, however, age group, reported health status, principal driver status and confidence of being a safe driver were associated with this. Those

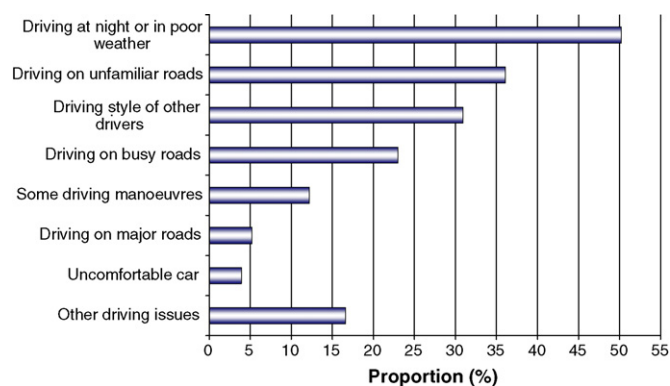


Fig. 2. Summary of driving situations that were reported as being a problem by current drivers.

who were aged under 75 years, who reported excellent or very good health status, were the principal driver in the household and were confident that they were a safe driver were more likely to drive about the same or more, compared with 5 years ago (age group,  $\chi^2_{(9)} = 19.95, p < 0.01$ ; health status,  $\chi^2_{(12)} = 33.86, p < 0.01$ ; principal driver status,  $\chi^2_{(3)} = 12.58, p < 0.01$ ; confidence of being a safe driver,  $\chi^2_{(9)} = 26.96, p < 0.01$ ).

Current drivers were asked to identify whether particular driving situations were a problem for them. 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 reported experiencing problems with driving at night or in poor weather conditions (50%), driving on unfamiliar roads or in unfamiliar areas (36%), the driving style of other drivers (31%), driving on busy roads (23%), and driving manoeuvres such as merging, changing lanes, etc (12%) (Fig. 2). Other reported driving issues included reversing into parking bays, getting lost, car breaking down and being tail-gated by other drivers (16%).

Reported problems with driving situations were associated with other variables and the outcomes of analyses are shown in Table 2. Definitions of variables examined are: age group (60–64 years; 65–69 years; 70–74 years; 75+ years); health status (excellent; very good; good; fair/poor); problems with vision for safe driving (yes; no); presence of ongoing medical conditions (yes; no); difficulties with daily living tasks [ADLs]; (yes; no); confidence of being a safe driver (very confident; moderately confident; not at all confident); principal driver status (yes; no); crash involvement in last 5 years (yes; no).

In general, older drivers with vision problems and self-reported poor health status were more likely than younger drivers without vision problems and self-reported good health status to report problems driving on unfamiliar roads and driving at night or in poor weather conditions. Those who reported vision problems were also more likely than those without vision problems to report having problems on major roads and older drivers were more likely than younger drivers to have problems with the driv-

Table 2  
Summary of comparisons between problems with driving situations and other variables for current drivers.

	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 (yes; no)	$p < 0.05$	$p < 0.01$	n/s	n/s	$p < 0.01$	$p < 0.001$
Medical condition	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-involved	n/s	$p < 0.01$	n/s	n/s	n/s	n/s

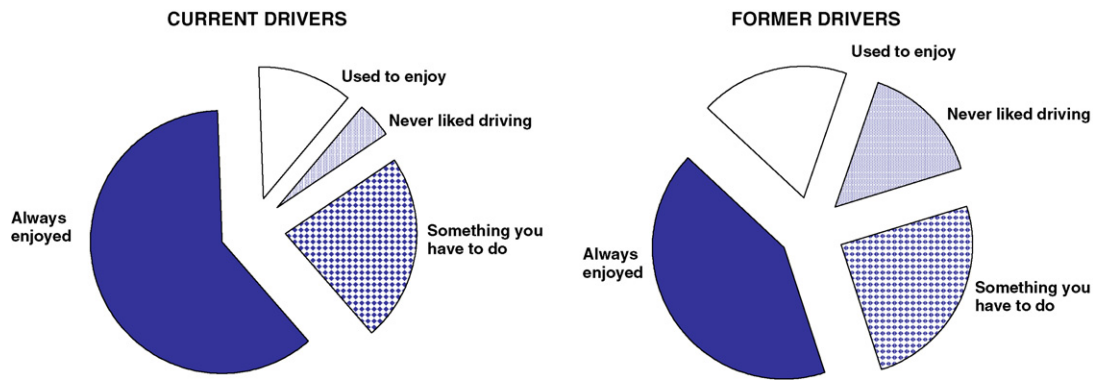


Fig. 3. Feelings about driving by current and former drivers.

ing style of other drivers. 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. Confidence of being a safe driver was highly associated with the likelihood of reporting problems with driving situations. Those who were moderately or not at all 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.

In addition, both current and former drivers were asked to describe how they felt about driving. Fig. 3 shows that the majority of current drivers (61%) and many former drivers (42%) indicated that they had always enjoyed driving, however, almost one-quarter of both groups felt that it was just something they had to do. A higher proportion of former drivers indicated that they did not enjoy driving much when they stopped (18%), compared with 12% of current drivers who indicated they did not enjoy driving much now. Similarly, a higher proportion of former drivers compared with current drivers indicated that they never liked driving that much (15% vs. 4%).

Feelings about driving amongst current drivers were associated with reported problems in driving situations. Those who reported no problems with driving situations were also likely to indicate that they always enjoyed driving. Those who reported problems in driving situations, particularly driving on busy and major roads in unfamiliar areas, were more likely to report less positive feelings about driving, with 23% indicating that driving is 'just something they have to do',  $p$ 's < 0.01. Moreover, feelings about driving were also associated with frequency and amount of driving and confidence of being a safe driver. Those who drove frequently and further distances, and who were more confident were more likely to report positive feelings about driving than those who drove less and lacked confidence,  $p$ 's < 0.05.

### 3.3. Driving reduction and cessation

Of the 20% of current drivers who indicated that they had reduced the amount of driving in the last 5 years, the majority (77%) indicated this was a gradual process. The most common reason for driving reduction was simply because there was no need to drive as often (93%). Other responses related to discomfort in driving: 39% indicated that they did not enjoy driving or just preferred not to drive as much, while 30% indicated that they did not feel as safe a driver as they used to.

In contrast, the majority of former drivers (58%) indicated that they stopped driving all at once, with 42% indicating that this was a gradual process. Moreover, the majority (66%) indicated that they did not experience any difficulty making these decisions and this

was so, regardless of whether the process of stopping was gradual or abrupt.

In general, current drivers had not thought much about the possibility of not driving one day, nor had they made many plans for this event. It appeared that 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 of driving cessation,  $\chi^2_{(3)} = 13.40$ ,  $p < 0.01$  and  $\chi^2_{(3)} = 10.53$ ,  $p < 0.05$ , respectively. Likewise, over one-third of former drivers did not think at all about the possibility of not driving one day whilst they were still driving and only 21% thought a lot about it. In addition, 12% reported that they consciously tried not to think about it.

In terms of future driving amongst current drivers, responses indicated that drivers felt very strongly about keeping driving, with 59% indicating that keeping driving for as long as possible was very important. This view was particularly evident amongst principal drivers, those who did not have another available driver in the household, drove frequently and longer distances, enjoyed driving and were confident of being a safe driver. Further, many drivers voiced strong concerns about not being able to drive including loss of independence (95%), inconvenience (to self and to others) (92%), problems reaching services and social limitations (84%).

Fig. 4 shows the proportion of participants indicating how many years they would keep driving by age group. Younger drivers were most likely to indicate that they would continue to drive for another 10 years, while older drivers were more likely to indicate shorter periods of time,  $\chi^2_{(12)} = 157.57$ ,  $p < 0.001$ . Older drivers were also

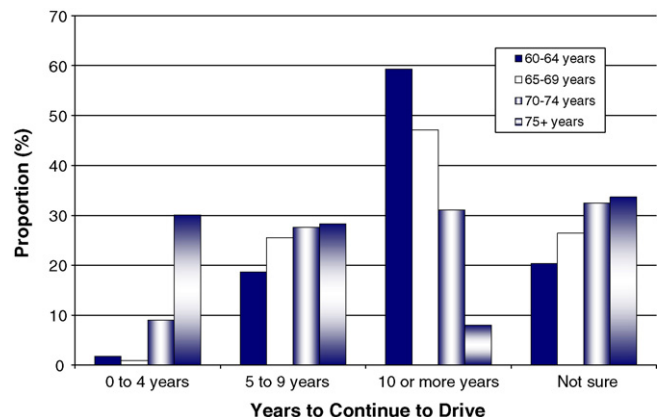


Fig. 4. Years to continue to drive by age group.

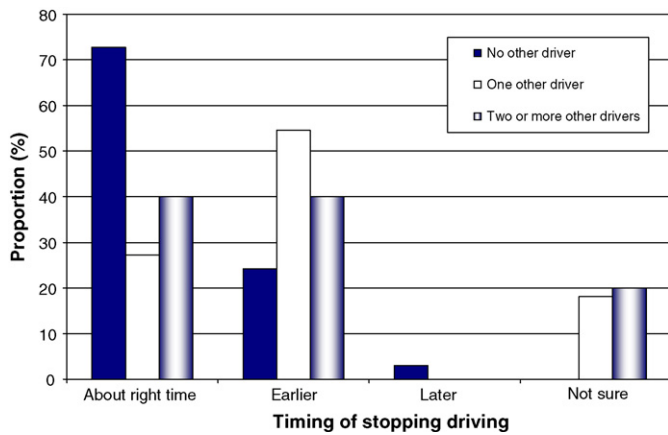


Fig. 5. Timing of stopping driving by presence of other driver in household.

more likely to be unsure about how much longer they would continue to drive than younger drivers.

A number of other factors were associated with expected years of continued driving. Those who did not have another driver in the household, those who were confident of being a safe driver and those who drove 50 km or more a week were more likely than those who had another driver available, were not confident and drove less to indicate that they will be driving for another 10 years or more,  $p$ 's < 0.05. Interestingly, those who reported having problems with their vision and difficulties with activities of daily living also expected that they would be driving for another 10 years or more,  $p$ 's < 0.05.

In response to the question 'what did ceasing driving mean to you?' there was a wide range of responses amongst former drivers. Broadly, these focused on loss of independence, freedom and quality of life and dependence on others for transportation (29%), difficulty in getting to places including social outings and shopping (20%), sadness and depression (9%), and requirement to change lifestyle (11%). There were positive responses also. One-quarter of former drivers were not worried about giving up driving and felt comfortable with the decision, and others (6%) indicated that it was a relief not to be driving any more.

Former drivers were also asked about the timing of their decision to stop driving. While 58% of the sample indicated that they thought they had stopped at about the right time, over one-third (34%) felt that they had stopped too early, only 2% felt that they had made this decision too late, while 6% 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 Fig. 5, those who had other drivers in the household 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.

With respect to mobility, transportation needs and use of alternative transport options, some differences were found between the responses of current and former drivers. Current drivers were much more likely to travel on a daily basis than former drivers. Almost one-fifth of former drivers indicated that they only went out a few times a month. Generally, both current and former drivers were satisfied with their current mobility, however, there was some suggestion that, for former drivers, this was associated with frequency of travel. Former drivers who travelled frequently (daily) were more likely to indicate that they were satisfied with their ability to get to places. Moreover, former drivers reported that, while transportation to undertake essential trips such as shopping and going to appointments were not adversely affected by not driving, 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.

### 3.4. Crash risk

Current and former drivers were asked to indicate whether they had been in a crash or incurred any traffic infringements (other than parking fines) over the last 5 years. Only 12% ( $n = 75$ ) of current drivers reported that they had been involved in a crash and 13% ( $n = 86$ ) had incurred infringements. Seven former drivers (13%) had been involved in a crash in the last 5 years of driving and none reported having incurred any infringements. Given that the numbers of reported crashes and infringements were low, there were few significant associations with other factors. However, some interesting associations for the sample of current drivers were found which are worth discussion and follow up.

Logistic regression was used to model the 'at-risk' older female current driver. Potentially important variables were selected on the basis of a priori knowledge and preliminary analyses using bivariate techniques. They included various demographic variables such as age group and health-related variables, distances travelled per week, principal driver status, and driving experience variables such as confidence of being a safe driver, problems in driving situations and feelings about driving. Summary figures for multivariate regression analyses for predicting crash involvement in the last 5 years are shown in Table 3.

This model indicates that principal drivers were more likely to have been involved in a crash in the last 5 years than non-principal drivers (adjusted odds ratio: 5.97, 95% CI: 2.49–14.29). Confidence of being a safe driver, too, appeared to be associated with crash involvement. The odds of a driver who was moderately or not at all confident of being a safe driver to have been crash-involved was 1.94 times that of a driver who was very confident of being a safe driver (95% CI: 1.12–3.37). For those who had problems with other drivers, the odds of being involved in a crash were 3.18 times greater if they also shared long-distance driving, compared to those who did not share the driving on long-distance trips (95% CI: 1.29–7.84). Further, for those who shared long-distance driv-

Table 3  
Summary of multivariate model statistics for prediction of crash involvement in the last 5 years.

Variable	Relative odds ratio	SE	z	$p >  z $	95% Confidence interval	
Principal driver status	5.97	2.66	4.01	0	2.49	14.29
Confidence of being a safe driver	1.94	0.55	2.36	0.018	1.12	3.37
Sharing the driving on long-distance trips	0.98	0.36	-0.06	0.952	0.48	1.99
Problems of driving style of other drivers	0.54	0.31	-1.09	0.276	0.18	1.64
Problems with driving in unfamiliar areas	0.25	0.14	-2.47	0.014	0.09	0.75
Problems with driving style of other drivers × problems with driving on unfamiliar roads	4.54	3.18	2.16	0.031	1.15	17.92
Problems with driving style of other drivers × sharing the driving on long-distance trips	3.25	1.90	2.01	0.045	1.03	10.24

Log likelihood = -189.58.

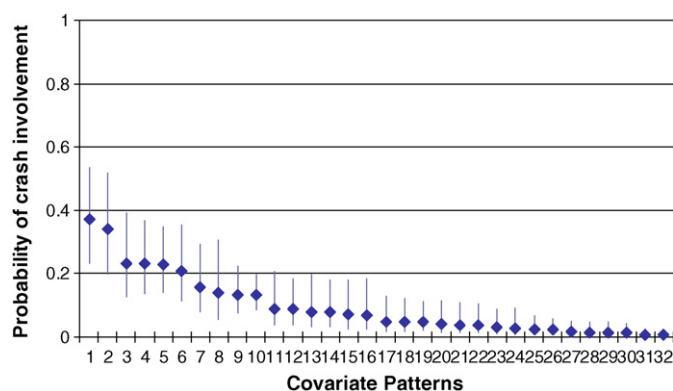


Fig. 6. Conditional probabilities of crash involvement for each of the covariate patterns.

ing and had trouble driving on unfamiliar roads, the odds of being crash-involved were 7.93 higher for those who also had problems with the driving style of other drivers compared to those who did not have problems with the driving style of other drivers (95% CI: 2.27–27.77).

Similarly, amongst those who did not share long-distance driving but also had trouble driving on unfamiliar roads, the odds of being crash-involved were 2.44 times higher for those who also had problems with the driving style of other drivers compared to those who did not have these problems (95% CI: 0.66–9.09). Last, for those who had problems with other drivers, the odds of being crash-involved for those who also had problems driving on unfamiliar roads was 1.15 times greater than those who did not have problems driving on unfamiliar roads (95% CI: 0.49–2.72). The confidence intervals of these variables were below 1, indicating non-significant odds ratios.

In order to identify more clearly the 'at-risk' older female driver, conditional probabilities for each of the covariate patterns were calculated and ranked. Fig. 6 shows the conditional probabilities of crash involvement for each of the covariate patterns. In sum, participant who did most of the driving in the household, were moderately confident or not confident at all regarding their safety as a driver, participated in long-distance driving, had a problem with the driving style of others and had problems driving on unfamiliar roads were the most likely to have been involved in a crash in the last 5 years.

#### 4. Discussion

Overall, this sample of current and former drivers was fairly active and independent, travelling frequently and considerable distances each week and generally satisfied with their level of mobility. The amount and frequency of driving undertaken by drivers, however, tended to decrease with increasing age. This finding was not unexpected and confirms that found in a previous study (Charlton et al., 2003).

Surprisingly, a high proportion of current drivers (70%) reported that they did most of the driving in the household. Many of these women were widowed, divorced or separated and did not have another driver available in their household. Of those who were married or living with a partner, nearly all (98%) reported that they were not the principal driver. These findings confirm past research suggesting that, among today's older couples, the male partner is generally the principal driver when couples drive together (Cedersund, 1990; Noble, 2000) and that women tend to drive fewer kilometres than men (Charlton et al., 2003; Rosenbloom, 1999; Sirén et al., 2001). This may indicate that non-principal drivers lack up-to-date driving experience which may adversely

affect their ability to perceive hazards and avoid risks (MacDonald, 1994; Massie et al., 1995). A large proportion of drivers also indicated that they shared the driving, however, this was generally amongst younger women and only on long-distance trips. It would be worth examining in more detail the circumstances of where and when driving is shared to gain a better understanding of this issue. It may be that, compared to older men, older women have less driving experience both quantitatively and qualitatively, particularly driving in more difficult, stressful or demanding driving situations such as urban driving (Bishu et al., 1991; Rimmö and Hakamies-Blomqvist, 2002; Simon and Corbett, 1996) and that this may contribute to crash risk.

Generally, this sample of drivers were confident about their safety status as drivers, however, over one-third of drivers indicated moderate or low levels of confidence of being a safe driver. Those that reported low levels of confidence were older, in poorer health, not the principal driver, had decreased the amount of driving undertaken, experienced some change in their confidence in the last 5 years, and expressed more negative feelings about driving. Further, less confident drivers also reported more difficulty in driving situations such as the driving style of other drivers, driving on unfamiliar roads, driving at night or in poor weather conditions, problems driving on busy roads, and performing complex manoeuvres. These findings support the contention of others that older women may be at increased crash risk as a result of lack of confidence and negative feelings about driving (Charlton et al., 2003; Hakamies-Blomqvist and Wahlström, 1998; Parker et al., 2001).

With regard to driving reduction and cessation, as expected, cessation was perceived as a negative life event amongst current drivers, with most believing that they would keep driving for a number of years to come and very few having thought about stopping driving. Also not surprising was the finding that healthier and more confident drivers who drove frequently and substantial distances, and did not have another driver in the household expected to keep driving for longer than drivers with poorer health, who lacked confidence, drove shorter distances and less frequently and had another driver available in the household. These findings may reflect reporting bias (which is a limitation of self-reported survey methods), or some level of optimism bias – given the evidence that that people of all ages can over-estimate their health, longevity and abilities (e.g., Sharot et al., 2007; Fernandes et al., 2007), and may be poor at recognizing the relationship between their own actions and potential risks (Holland and Rabbitt, 1992). Alternatively, these findings may simply demonstrate at least some awareness of the relationship between health status and driving ability and that those in better health are more mobile, younger and able to drive longer distance and expect to drive for a longer time in the future, compared with those reporting poorer health.

Only one-fifth of drivers had reduced the amount of driving they did in the last 5 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 (Eberhard, 1996; Rumar, 1986; Smiley, 1999), and a practice that is more common amongst women than men (Burkhardt et al., 1998; Charlton et al., 2003; Hu et al., 2000), the majority of this group reported that they had reduced their driving simply due to a reduced need to drive and other lifestyle reasons. There were, however, some who reduced their driving for reasons relating to discomfort or loss of confidence, decreased enjoyment and decreased feelings of safety.

Interestingly, former drivers were less negative about driving cessation. The majority retired from driving successfully and with little difficulty, and were satisfied with their decision, even though many did not think much about the possibility of not driving, very few had made plans and a substantial proportion expressed negative feelings at the time of driving cessation focusing on loss of

independence, freedom and quality of life, sadness and dependence on others, difficulty getting to places and requirement to change lifestyle.

The findings regarding the timing of driving cessation largely confirm past research suggesting that some older women cease driving prematurely, and that this is related to the presence of another driver in the household (Charlton et al., 2003; Hakamies-Blomqvist and Sirén, 2003; Stutts et al., 2001; Stutts et al., 1999; West et al., 2003;), however, the findings also suggest that, once the decision has been made to cease driving, the perceived consequences may not be as negative as previously thought.

One of the main issues emerging from this study was the identification of contributing factors to crash risk for older female drivers. The causes of older driver crashes are undoubtedly complex and poorly understood, however, the over-representation of older drivers in fatal and serious injury crashes has been associated with a range of factors in the literature including age-related changes in functional performance (Marottoli et al., 1998; OECD, 2001), inappropriate risk perception (Holland and Rabbitt, 1994; Kostyniuk et al., 1998; Matthews, 1986) and increased vulnerability (Evans, 2001; Ulfarsson and Mannering, 2004). There are also some reported specific gender differences, with suggestions that lack of driving experience and confidence, prevalence of illness and greater physical frailty can place older women at higher crash and injury risk compared to older men (Evans, 1991; Hu et al., 2000; Margolis et al., 2002; Massie et al., 1995; Ulfarsson and Mannering, 2004).

The current findings generally support previous research, but also highlight some additional and interesting important contributing factors. In sum, the most 'at-risk' covariate pattern for current drivers was drivers who:

- Were the principal driver,
- were moderately or not at all confident that they were a safe driver,
- shared the driving on long-distance trips,
- had problems with the driving style of other drivers, and
- experienced problems driving on unfamiliar roads.

As indicated previously, the evidence suggests that driving experience, both quantitative and qualitative, can affect crash risk, and that older women may be at increased risk as a result of lack of experience (Bishu et al., 1991; Rimmö and Hakamies-Blomqvist, 2002). Likewise, it is reported that many older women lack confidence in driving and therefore experience stress in some traffic situations, drive less and therefore lack up-to-date driving experience (Hakamies-Blomqvist and Wahlström, 1998; Massie et al., 1995; Parker et al., 2001). The findings that drivers who reported some problems in driving and traffic situations and are only moderately confident or not at all confident of being a safe driver lend support to this argument.

It was somewhat surprising, however, to find that principal driver status was associated with increased crash risk, given the past research suggesting a relationship between lack of driving experience and increased crash risk. While this finding may purely be an artefact of increased exposure – those who drive more are exposed for longer periods of time to the risks of crashes – it was also interesting to find that lack of confidence and difficulty in some traffic situations contributed to the likelihood of crash involvement, suggesting that the 'exposure hypothesis' cannot fully explain crash risk. More research is required to clarify these associations.

It was also surprising to find that neither poor health, vision conditions or presence of ongoing medical conditions contributed to increased risk of crash involvement, particularly given the emphasis that is often placed on establishing associations between age-related health and functional performance factors and crash

risk in the literature (Dobbs, 2001; Janke, 1994). It should be noted, however, that given that the number of reported crashes were low amongst this sample of drivers, these findings should be treated with caution. Again, more comprehensive examination of these issues is warranted.

There were some limitations of the study. This survey clearly focussed on the experiences and issues that may be unique to older female current and former drivers, but does not provide any comparison with the experiences and issues of older male drivers and former drivers. While the findings provide some worthwhile information regarding older females' driving experiences, safety and mobility, it would be worthwhile to extend the survey to include a sample of male current and former drivers in order to investigate gender comparisons. In addition, this survey was conducted in one jurisdiction of Australia and one of the main difficulties is the problem of generalisability of the findings. However, an attempt was made to recruit a representative sample of older females in the population in the recruitment methods and, given the similarities of our findings to previous studies, it is likely that the sample is representative of female drivers in general. Moreover, given the small sample of former drivers in this study (this sub-group of the older population is inherently difficult to target and recruit), 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.

## 5. Conclusions

This research has provided a rich source of information about the travel and driving patterns of older women current and former drivers in Australia. The results have confirmed for a sample of Australian women, many of the findings from previous research with drivers in other western countries and highlighted a number of interesting findings relevant to the safe mobility of older women in Australia, particularly the factors that may affect crash risk. This information translates to the need for a well-structured educational resource to address the specific problems of this group and to provide information on how to maintain safe mobility. Recommendations include: provision of general information about the factors that increase crash risk such as functional performance factors, physical frailty, consequences of lack of up-to-date driving experience, lack of confidence and the avoidance of difficult driving situations; information on how to keep driving safely for as long as possible; information on the benefits and disbenefits of driving reduction and cessation and successfully retiring from driving at the right time; and information on ways to maintain satisfactory mobility without the car. The findings can assist in improving licensing procedures, particularly the adoption of appropriate identification of 'at-risk' drivers and a more strategically targeted licensing re-assessment procedure that acknowledges the many confounding variables that may increase risk of crashing due to health conditions or functional deficits. Further, these findings highlight the need for further research to explore the relationship between crash risk, driving experience, confidence and functional performance.

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