

**Health Knowledge Related to Driving, and Driving
Associated Anxiety: A Public Health Approach to
Driving in Later Life**

**A Report from Research Funded by the NRMA ACT Road Safety Trust,
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1 Executive summary

1.1 Aims and rationale

The project had two broad aims. First, to identify what older drivers do and do not know about physical health issues and conditions that may influence their personal driving safety. This is important because it will enable development of targeted education programs for older adults to allow people to make informed decisions about whether changes to their driving behaviour should be considered. The second aim was to measure anxiety related to driving, and driving cessation in later life. Anecdotal evidence suggests that psychological distress related to driving and driving cessation is prevalent among older adults. This is a new domain of enquiry and as yet little data exists to support individual reports. We aimed to explore the extent, and potential seriousness of this problem in the community, and to determine whether there is a need for additional resources to be directed towards the management of anxiety associated with driving among older adults.

1.2 Methodology

1. Development of the questionnaire: Focus groups with older adults were held to identify suitable questions for inclusion in a questionnaire.
2. Pilot study: Randomly selected participants and volunteers who had previously participated in research on older drivers at the Ageing Research Unit were invited to pilot the questionnaire.
3. Questionnaire refinement: Input from participants and researchers led to substantial changes in the content and administration of the interviews. The feasibility of asking questions over the phone was established.
4. A random sample of 323 adults aged 65 and older was recruited from the electoral roll, and advertisements in the regions of Canberra and surrounding rural areas. Participants completed a telephone interview.

5. Analyses of de-identified data involved producing descriptive information on levels of health knowledge and anxiety related to driving according to place of residence (urban/rural) and age.

1.3 Key findings

Whilst approximately 70% of older drivers had accurate knowledge about the health conditions investigated, a significant minority could improve their knowledge, particularly with reference to the potential effects of dementia and eye disease. Most older adults reported that they would consult a general practitioner if they required information on health issues related to driving. Among participants who reported experiencing a medical condition, a relatively low proportion reported receiving specific information from their general practitioner on how their medical condition could affect their fitness to drive.

Most of the older adults surveyed did not experience any significant degree of anxiety related to driving. A substantial number of participants reported adapting their driving in response to possible concerns. Around 15% of drivers reported having curtailed everyday out-of-home activities due to driving-related anxiety.

1.4 Summary of recommendations

Improvement in the availability, quality and delivery of health information relevant to driving is required, particularly in the areas of dementia and eye disease. This may involve more effective co-ordination of resources currently available. Further investigation of the characteristics of the small group of older drivers who reported substantial anxiety related to driving is required to allow for tailored interventions to improve their mental health and quality of life in relation to driving and mobility issues.

2 Introduction

2.1 Health, age and driving

Individuals aged 65 years and over represent the most rapidly growing segment of the driving population, and are keeping their licenses longer (Wang & Carr, 2004). Disease-related factors that may affect the ability to drive safely increase in prevalence with age, and some normal changes occurring with ageing may also reduce capacity to drive safely in some individuals (Gilhotra, Mitchell, Ivers, & Cumming, 2001). Medical conditions that increase in prevalence with advancing age, which have been associated with an increased risk of accident involvement include dementia (Alzheimer's Disease; Adler, Rottunda, Rasmussen, & Kuskowski, 2000; Carr, Duchek, Meuser, & Morris, 2006; Uzzell & Muckle, 2005), cerebrovascular incident (McGwin, Sims, Pulley, & Roseman, 2000; Sagberg, 2006), cardiovascular disease (McGwin et al., 2000) and cardiac infarction (Sagberg, 2006). Type 2 diabetes in combination with low adherence to an appropriate medical regime (Harsch et al., 2002; Sagberg, 2006) and other related conditions such as diabetic neuropathy have also been linked to increased accident risk (McGwin et al., 2000). Other medical conditions that can pose a risk to driving safety include psychological conditions such as anxiety and depression (Brunnauer & Laux, 2003; Sagberg, 2006), arthritis (McGwin et al., 2000) and eye conditions common to the older population including cataract (Owsley et al., 2002; Owsley, Stalvey, Wells, Sloane, & McGwin, 2001), glaucoma (Owsley et al., 1998) and macular degeneration (Scilley et al., 2002).

The use of various medications for the treatment of chronic medical conditions can also have an adverse effect on driving ability. A recent report identified narcotics, antipsychotics, and muscle relaxants as each having the potential to increase accident risk, while the use of multiple medications can significantly increase impairment of driving skills (Movig et al., 2004). Antidepressants (Carr et al., 2006), antihistamines that can cause drowsiness (Carr et al., 2006; Sagberg, 2006), benzodiazepines (McGwin et al., 2000), sleep medications (Verster & Volkerts, 2004), or hypnotics

(Carr, Flood, Steger-May, Schechtman, & Binder, 2006), non-steroidal anti-inflammatory medications (Verster, Veldhuijzen, & Volkerts, 2006), ACE inhibitors and anticoagulant medications (McGwin et al., 2000) have also been associated with increased accident risk. Age-related changes in visual acuity, sensitivity to glare and visual contrast sensitivity, reduction in physical strength and slowing of reaction time may also influence the capacity to drive safely in some situations (Anstey, Wood, Lord, & Walker, 2005).

2.2 Representation of older drivers in the road accident statistics

Several studies have sought to quantify the extent to which older adults are represented in road accident statistics. Lyman et al. (Lyman, Ferguson, Braver, & Williams, 2002) reported an over-representation of adults aged around 70 and older in motor vehicle accidents after statistical adjustment for kilometres driven, while Langford et al. (Langford, Methorst, & Hakamies-Blomqvist, 2006) identified just those older drivers who drive less than 3000 km a year as being at an elevated risk of crash involvement. Tay (2006) found that older drivers had increased accident risk after adjusting for distance travelled, however older drivers appeared to have a reduced crash risk per unit of time, indicating that an increase in the population of older drivers would not have a significant impact on monthly crash rates.

The broader significance of the increasing population of older drivers for road safety remains a topic of some controversy. However the available research is clear in identifying the often dire consequences of accidents for older road users, with studies showing that older drivers who are involved in an accident are more likely to be seriously injured or killed relative to their younger counterparts (Lam & Lam, 2005; Yee, Cameron, & Bailey, 2006).

2.3 The importance of maintaining driving capability

Despite possible age-related health and safety considerations, driving capability often remains fundamental for maintaining the independence of older adults, especially for those in rural or remote areas, and is intimately linked to other activities of daily living (Gilhotra et al., 2001; R. A. Marottoli & Richardson, 1998; Persson, Berglund, & Sahlberg, 1996). Researchers and policy makers concerned with both healthy ageing and road safety are becoming increasingly mindful of the extent to which older drivers could face increased risk of accident involvement, as well as the broader social implications of driving-related issues for older adults and their families.

The majority of older drivers are safe, and regulate their own driving behaviour well. Moreover, for many older adults, retaining the capacity to drive frequently has important practical and psychological consequences for health and well-being. Being a driver is associated with the maintenance of a sense of identity and independence in later life (Rudman, Friedland, Chipman, & Sciortino, 2006; Yasuda, Mino, Koda, & Ohara, 2002), and readily enables mobility for essential and non-essential out-of-home activities ranging from medical appointments, to grocery shopping and social engagements. Individuals who have reduced or ceased driving may be at increased risk of isolation, depression, and associated functional impairment (Fonda, Wallace, & Herzog, 2001). A loss of mobility may reduce an individual's access to resources known to protect their quality of life, such as employment, community activities, friends, family and health care services (R. A. Marottoli & Richardson, 1998). Driving cessation has also been linked to increased depressive symptomatology in several studies (Fonda et al., 2001), while a recent paper by Freeman and colleagues (Freeman, Grange, Munoz, & West, 2006) indicated that older adults who were no longer driving were more likely to be female, cognitively impaired and depressed compared to those who were still driving.

We have proposed in earlier work that the capacity to self-regulate, based on an awareness of physical limitations, is potentially a more important factor for determining driving behaviour, than driving ability (Anstey et al., 2005). However, self-regulation requires knowledge of factors that may place an individual at greater

risk on the road. Accurate knowledge and understanding of factors that affect driving safety provides a foundation for the effective self-regulation of driving behaviour. A primary aim of the present study was to explore levels of health knowledge related to driving in a sample of older adults.

2.4 The importance of health knowledge related to driving for personal decision-making

Older adults' decisions concerning changing driving behaviours, and finally 'retiring' from driving may be influenced by a range of factors, including the accessibility of community resources (e.g., shops, healthcare) and the availability of acceptable alternative transport options, as well as an understanding of how health status, sensory functions and medication use may impact on driving capacity and safety. Consequently, it is important that beliefs and knowledge about the issues that affect driving safety are accurate. There is a paucity of research examining older individuals' health knowledge in the context of driving competency and road traffic safety, and limited research examining health literacy in ageing more generally. In addition to knowledge related to specific health conditions, the extent to which drivers are aware of the potentially detrimental effects of different medications on driving performance is also an important factor in informing decisions regarding driving behaviour. Despite this, the availability of information about the side effects of medication may be less than optimal, with one study reporting that up to one-third of older adults had not received any information about the effects of prescribed medications on driving (Metlay et al., 2005).

Research conducted on health literacy has focussed on adults' ability to interpret medical information (Davis, Gazmararian, & Kennen, 2006) rather than testing knowledge relevant to specific areas. For instance, the extent to which older adults are aware of health and road safety issues such as eye disease placing individuals at greater crash risk, or the effects of certain prescribed medications on driving

performance is not known. Furthermore, we do not know what sources of information older adults are most likely to use in increasing their health knowledge.

Research concerned with the health-belief model has shown that knowledge concerned with medical conditions and associated behavioural outcomes has a positive influence on self-care and health behaviour (Buck, Godfrey, & Morgan, 1997; Fink, Beck, & Wittrock, 2001; Wardle, Parmenter, & Waller, 2000). In the driving context, accurate knowledge regarding the influences of health and medication use on the capacity to drive safely could be critical in providing older adults with an accurate basis upon which to adapt their driving behaviour where necessary.

2.5 Knowledge and adaptive self-regulation

Baldock et al. (Baldock, Mathias, McLean, & Berndt, 2006) suggest the promotion of adaptive self-regulation as a mechanism for supporting the safety and independence of older drivers. Such a process would involve older drivers evaluating their personal health status and capacity, thereby identifying their limitations and taking responsibility for a program of behaviour change. The availability of accurate information regarding health-related risk factors for impaired driving ability could provide a key component of effective self-regulation. In a study of South Australian older drivers, Baldock et al. (2006) produced evidence to suggest that older drivers engage in some self-regulation under circumstances where they lack confidence, such as night driving during wet weather, however in general avoidance of potentially difficult situations was low. A study by Freeman et al. (Freeman, Munoz, Turano, & West, 2005) indicated that older drivers, particularly females and those with poor health do regulate their driving, however the level and effectiveness of self-regulation is at least partly determined by available knowledge.

The concept of self-regulation is central in the context of promoting older driver safety. By adapting their behaviour to compensate for health-related limitations, older drivers can remain safe road users for as long as possible. Such an approach is in

contrast to the alternatives of maintaining life-long driving patterns and habits in spite of age-related physical and/or cognitive decline, or retiring from driving prematurely.

2.6 Health knowledge and driving-related anxieties

Promoting health knowledge related to driving may also serve to reduce concerns and anxieties that some older individuals have regarding their ability to drive safely, and may provide a basis for decisions on whether they should consider avoiding driving under specific conditions or cease driving completely. There is scant research examining driving-related anxiety in older drivers. However, a Spanish study of older drivers (median age = 70 years) found that many of the drivers expressed some driving-related anxiety including beliefs that they had lost their ability to drive safely because of deteriorating physical and mental abilities. Older drivers also endorsed the belief that the general level of driving capability is currently poorer in the community than in past years, which was associated with worry about their ability, and perceptions that roads and traffic are unsafe (Monterde i Bort, 2004). How driving-related anxiety affects driving behaviour is unclear, but it may lead to older drivers increasing safety behaviours to compensate for perceived or real physical limitations and a sense of vulnerability (Hakamies-Blomqvist, 1994). One potential negative outcome of driving-related anxiety is that some older drivers may be overly cautious and decide to cease driving altogether, when in fact they may have the skills and capacity to remain competent drivers. Enhanced health knowledge may reduce driving-related anxiety for some older drivers, and allow them to make informed decisions about their ability to continue driving.

Anxiety or fear related to mobility concerns are common in older adults, as documented in the vast literature on “fear of falling” which is now considered a serious issue and is routinely assessed in falls clinics (Lawrence, Tennstedt, & Kasten, 1998; Letgers, 2002; Powell & Myers, 1995). Fear of falling occurs in between 29 and 92% of those who have experienced previous falls, and 12 to 65% of those who have not (Howland et al., 1993). Fear of falling is more prevalent in women than in men

and increases in prevalence with increasing age (Arfken, Lach, Birge, & Miller, 1994). One focus of the present study is to determine whether driving related anxiety follows a similar pattern in the community.

2.7 Knowledge, feelings and impacts of driving cessation

For older adults, anxiety associated with driving may not be solely due to the stress of maintaining safe driving practices in the face of physical, sensory or cognitive decline. The ultimate prospect of having to cease driving altogether, and the associated repercussions may be an additional cause of psychological distress. Previous research suggests that certain lifestyle and identity transforming events, lead to acute as well as persistent depressive symptoms in the older individuals who experience them (Fonda et al., 2001). Inasmuch as the transition from driver to ex-driver changes one's lifestyle and identity, it could be a risk factor for worsening depressive symptoms (Marottoli et al., 2000; Marottoli & Richardson, 1998). For many older drivers even the thought of being assessed for one's licence is also very distressing. Qualitative research suggests that just as some older drivers have anxieties concerning the driving task, others experience distress at the prospect of having to relinquish their driver's license (Dellinger, Sehgal, & Sleet, 2001). The impact of driving cessation on mobility, independence and quality of life is potentially great, especially for individuals in rural communities where alternative transport options may be limited. In the specific case of the Australian Capital Territory, many older people in neighbouring southern New South Wales rural townships commute regularly to Canberra to access a range of community and health services. Hence, driving cessation-related anxiety may be a particularly significant issue for rural older drivers.

2.8 Consideration of age differences among older adults and urban/rural environments

Previous research into older drivers has typically treated all adults over the age of 65 as a single group (Fonda et al., 2001; Marottoli et al., 2000; R. A. Marottoli & Richardson, 1998; Monderde i Bort, 2004). However, from a lifespan developmental perspective, we know that this later part of the lifespan consists of distinct developmental phases, characterised by associated physical and psychological issues and characteristics (Anstey et al., 2005; Fonda et al., 2001; Roge et al., 2004; Wood, 2002). Recognition of the differences between adults in their 60s and 70s and those in their 70s and 80s is essential for obtaining accurate information about driving beliefs and behaviours. A better understanding of psychological factors such as beliefs about safe driving and affective states that influence decisions to continue, cease or adapt driving among the young-old (65-75), old-old (76-85) and oldest old (85+) is required. This will enable appropriate interventions to be developed to assist older adults in the self-assessment of driving capacity and whether they need to consider adapting their driving behaviours.

A number of the experiences and issues faced by older road users are likely to vary as a function of their place of residence. Specifically, urban-dwelling adults are likely to have easier access to essential services and transport alternatives relative to those residing in rural and regional areas. Urban older drivers may also have greater access to sources of information regarding factors that could influence driving safety. As a result, rural-dwelling older drivers may have more limited knowledge of health-related factors that affect driving, and may experience a greater degree of anxiety associated with the prospect of driving cessation, given their reduced access to viable transport alternatives.

2.9 Aims

The study had the following broad aims:

- a) To develop and conduct a survey of health knowledge related to driving among older adults, and to compare young-old, old-old and oldest-old on this measure, both within urban and rural settings.
- b) To develop and conduct a survey of anxiety associated with driving and driving cessation among older adults, and to compare young-old, old-old and oldest-old on this measure, both within urban and rural settings.
- c) To explore the relationship between anxiety and level of health knowledge related to driving.

3 Method

3.1 Phase 1: Questionnaire design

The first phase of the investigation involved developing the various measures relevant to the study aims. This process included conducting focus groups, literature searches and reviews, and consultations with various health professionals.

3.1.1 Literature review

Relevant literature was examined on older drivers and issues they may face, with particular emphasis on health related issues such as medical conditions and medication use, and their impact on driving safety. Literature concerned with the factors that impact on driving ability was also examined. The information obtained from the literature review informed the development of questions that were used to prompt discussion in subsequent focus groups.

3.1.2 Focus groups

Participant recruitment

Participants were recruited from a register of older adults who had previously indicated an interest in participating in driving related studies at the Centre for Mental Health Research. Participants were contacted by telephone and invited to take part in the focus groups. An information letter containing details of times and location, information about the study and a consent form were sent to participants via the post. Participants were then telephoned approximately 3 days before the group was due to meet as a confirmation of their attendance and a reminder to bring signed consent forms.

Procedure

Three focus groups consisting of 22 adults aged 60 years and older. The first group consisted of 4 males and 4 females, the second group included 2 males and 4 females and the third group, 5 males and 3 females. All focus groups were held at the Centre for Mental Health Research and ran for approximately 2 hours. Each group was attended by two project investigators who facilitated discussion around health-related factors that were perceived as having the potential to affect driving ability, and additional anxiety-provoking issues concerned with driving. Participants were also asked to discuss the prospect of giving up driving in the future, and whether the issue of driving cessation is a source of anxiety.

The focus group discussions were recorded and transcribed. The transcriptions were used to extract commonly occurring themes that were subsequently used to inform the development of items included in an initial telephone interview protocol for use in the pilot study.

3.2 Phase 2: Pilot study

The initial interview protocol was piloted using a sub-sample of the randomly selected target population (details below). The aim of the piloting phase was to ensure

the interview questions were suitable to the target population, readily administered over the telephone, to eliminate redundant questionnaire items, and to minimise administration time, thereby reducing participant burden.

3.2.1 Participant recruitment

An application was submitted to the Australian Electoral Commission (AEC) for supply of elector information for 2,334 randomly selected individuals aged 65 and over from the Hume, Canberra and Fraser electorates. The requested information was stratified by age and gender, with over-sampling in the oldest age groups. Based on previous experience of community-based research with older adults, we estimated that 30% of those contacted would agree to participate, with 50% of this group being current drivers and therefore eligible to be interviewed. This resulted in an expected response rate of 15%, which would provide adequate participants for both the pilot and main studies. Records provided by the AEC were stored in a database that provided the central source of information for the mail-out and interview phases of the project.

The participant pool provided by the AEC was randomised, and 150 invitations were initially sent, resulting in the recruitment of 20 participants (16% response rate). Older drivers that had participated in the focus groups (see Appendix 7 for focus group questions) were also invited to contribute to piloting, resulting in an additional 16 participants and a total sample of 36 for the pilot phase.

3.2.2 Refinement of the questionnaire

The interview protocol was repeatedly revised and refined based on feedback from pilot study participants, and the interviewer's experience in administering the questionnaire. The study investigators also provided significant input into this phase by drawing on their expertise in research on ageing and driving related issues, questionnaire design and psychometrics, and clinical psychology.

After a number of iterations throughout the pilot phase, a final interview protocol was agreed upon for use in the main study.

3.3 Phase 3: Main study

3.3.1 Participant recruitment

Interviews with 323 drivers 65 years and older from Canberra and the surrounding rural regions were conducted by telephone. Participants were initially recruited using the remaining details that were provided by the AEC, as described above. A lower than anticipated response rate of 11.19% (241 participants) was obtained from the initial mail-out. Consequently a further 82 participants were recruited through community group networks and placing notices in local newspapers.

3.3.2 Telephone administration procedures

Participants were asked a series of questions, with most related to their knowledge of medical conditions related to driving, their experience of relevant medical conditions, and their driving behaviour. Only those items and measures that are included in this report are described below. Responses were recorded by the interviewer using APOLLO (Computer Assisted Telephone Interviewing) software. The time taken to administer the questionnaire was approximately 20-30 minutes, however on some occasions the interview ran for longer.

3.3.3 Measures

Socio-demographic characteristics

Items related to socio-demographic characteristics included age, postcode, gender, marital status, education, employment status, accommodation, distance to local facilities such as shops, healthcare, and public transport, in addition to current driving status and age at which their driver's license was first obtained.

General self-rated health

General self-rated health was assessed by asking participants to rate their health as “Excellent”, “Very good”, “Good”, “Fair” or “Poor”.

Health knowledge

Thirteen items, designed specifically for this study, measured knowledge related to the impact of medical conditions on driving safety. Participants were asked whether they thought each of a series of medical conditions could affect a person’s ability to drive safely. Respondents were told that they could answer yes, no, don’t know or they could indicate if they thought it would depend on certain circumstances. Items included medical conditions such as “Having a heart condition”, “Arthritis”, “Cataracts severe enough to require treatment”, “Early stage dementia” and “Depression”. Some medical conditions that are not generally recognised as posing a significant threat to driving capacity were also included as distracters (varicose veins, asthma/bronchitis and dermatitis). Brief definitions of each of the conditions were provided to participants who requested further information.

Medication knowledge

Knowledge about the effects of several medications on driving ability was measured using 7 items developed for use in the current study. Participants were asked to indicate whether they thought each medication could have a negative effect on driving. Consistent with the health knowledge component, participants were provided with the options of “Yes”, “No”, “Don’t know” and “It depends on certain circumstances”, again allowing them to specify what the circumstances are. Items presented broad classes of medications, including “Medications to help you sleep”, “Medications for depression or anxiety”, and “Taking medications for depression or anxiety, in addition to medication to help you sleep”. Distracter items included “Anti-inflammatory medications” and “Non-drowsy antihistamines”.

Experience of medical conditions

Participants were also asked about whether they had experienced any or all of 4 specific medical conditions known to have an impact on driving ability. These conditions included “Conditions that affect the eyes such as cataract, glaucoma or macular degeneration”, “Stroke”, “Arthritis, stiffness or joint pain severe enough to interfere with daily activities”, and “A heart condition or had a heart attack”. If participants reported experiencing any of these conditions, they were then asked how long it had been since this diagnosis was made. They were also asked whether they had made any changes to driving behaviour due to this condition, and if so, to specify the changes made. Responses were then coded into two categories: “Adaptive changes made” and “No adaptive changes made” based on whether the changes described were specifically implemented to reduce driving-related risks. Participants were also asked whether they had received any advice from their general practitioner relating to the potential effects of the condition on driving.

Medication use

Participants were asked a series of questions about medications they were taking currently or had taken in the past. They were asked whether they had taken or are currently taking medications to “Help them sleep” or “Medications for depression or anxiety”. If they responded “Yes” to either question, they were then asked to indicate how long they had taken that medication using the following options: “Less than 1 year”, “1-2 years”, “3-5 years” or “More than 5 years”. They were also asked whether their doctor or pharmacist offered them any advice on how it may affect their driving in the future.

Sources of health-related information

Participants were asked where they would find information relating to whether a medical condition or medication could affect driving safety. This was an open-ended

question, allowing respondents to list multiple sources that were coded into the following categories: “General practitioner”, “RTA”, “Internet”, “Friend/relative”, “Pharmacist”, “Literature”, “Specialist”, “Medication label/packet”, “Other”, and “Don’t know”.

Driving-related anxiety

Sixteen items were used to measure levels of anxiety related to driving. The anxiety items comprised three sections. The first section consisted of seven questions that asked participants to rate on a scale of 1 to 5 (1 being “Never” and 5 being “Very often”) how frequently they worried about each of a series of potential sources of anxiety, including “Your health affecting your ability to drive safely” and “Your driving ability”. The second section included four questions asking participants to rate how often driving related worries or concerns would result in them avoiding certain driving activities. Questions included “Driving at night” and “Driving on unfamiliar roads”. The third section included 5 questions that asked participants to rate how often driving related worries or concerns stop them from taking part in certain activities. The activities included “Taking part in social activities” and “Attending medical appointments”.

Generalised psychological distress

The Goldberg symptom scales (Goldberg, Bridges, Duncan-Jones, & Grayson, 1988) were used to measure anxiety and depression. Participants were asked whether they had experienced symptoms of depression (9 symptoms) or anxiety (9 symptoms) in the past 4 weeks. Depression symptoms included “Have you had low energy” and “Have you felt slowed up?” The anxiety symptoms included “Have you felt keyed up, or on edge?” and “Have you had difficulty relaxing?” Symptoms were summed to give total scores for anxiety and depression.

Driving behaviour

Six questions adapted from Anstey and Smith (2003) for use in the telephone interview context were used to assess driving behaviour and driving frequency.

Participants were initially asked how often they drive (“Every day”, “Four to five times per week”, “Two to three times per week”, “Once per week”, or “Less than once per week”) and how often they drive alone (“Never”, “Occasionally”, “Half of the time”, “Most of the time”, or “Always”). A subsequent question asked whether participants would drive “To places they know well”, “Places they know well and have only been to once or twice before”, or “Places they have never been before”. Participants were also asked to indicate the longest trip they would take if they were the only driver, whether they drive at night, and if they had reduced the frequency of their driving at night.

Driving cessation

Anxiety related to driving cessation was measured using two questions developed for the study. The first asked participants how often they worry about having to give up driving some time in the future. Response options included “Never”, “Rarely”, “Sometimes”, “Often” and “Very often”. Participants were also asked to rate on a scale of 0 to 10 how much of an impact having to give up driving would have on their life, with higher scores indicating a higher impact.

Further questions asked about years of driving experience and frequency of long distance travel of 100km or more. Confidence in driving ability was assessed by asking participants to rate their confidence as “Excellent”, “Good”, “Average”, “Fair”, or “Poor”.

3.4 Preparation of data and analysis

The data obtained from the telephone interviews using APOLLO were exported from their original form (.dat) into SPSS, and converted into usable variables using SPSS syntax commands. All analyses were conducted using SPSS. Statistical significance of bivariate relationships was assessed using chi-squared analysis, t-tests and Spearman’s rank-order correlation where appropriate.

3.5 Ethical considerations

Participation in all phases of the study was voluntary, and participants were free to withdraw at any time. Participants provided written consent before taking part in focus groups and interviews. The study protocol was approved by the Australian National University Human Research Ethics Committee under the ethical guidelines set out by the National Health and Medical Research Council.

4 Results

Of the 323 older drivers that were interviewed, 13 respondents were excluded from the analysis. Seven held restricted licences, three could not be identified as belonging to either the rural or urban category, two were excluded due to missing data and one was excluded because they no longer held a driver's licence. The following analyses included the remaining 310 participants. Respondents living in Canberra were classified as *Urban* and those in the surrounding areas were classified as *Rural*. Most of the statistics presented in this report are stratified by place of residence in order to reflect urban/rural differences in knowledge, perceptions and anxiety related to driving.

4.1 Characteristics of the sample

4.1.1 Demographic characteristics

Demographic characteristics for the total sample and by place of residence are shown in Table 1. Participants were predominantly male, and ranged in age from 65 to 92 years, with a mean age of 77. Most participants were independently community-dwelling and married, with around two-thirds of participants reporting that they lived with one or more co-residents. Rural participants were more likely to have left school at a younger age, and less likely to have obtained formal educational qualifications relative to their urban counterparts, however these differences were not statistically significant. Around three quarters of the sample reported being retired.

Table 1. Demographic characteristics of rural and urban older drivers

	Rural (n=103)	Urban (n=207)	Total (n = 310)
Gender			
Males (%)	70 (68.0)	128 (61.8)	198 (63.9)
Females (%)	33 (32.0)	79 (38.2)	112 (36.1)
Age (years)			
Range	65 – 92	65 – 92	65 – 92
Mean (SD)	77.7 (7.76)	77.18 (7.15)	77.35 (7.35)
Marital status			
Married (%)	72 (69.9)	128 (61.8)	200 (64.5)
De facto (%)	1 (1.0)	1 (0.5)	2 (0.7)
Separated (%)	3 (2.9)	0 (0.0)	3 (1.0)
Divorced (%)	6 (5.8)	11 (5.3)	17 (5.5)
Widowed (%)	17 (16.5)	59 (28.5)	76 (24.5)
Never married (%)	4 (3.9)	8 (3.9)	12 (3.9)
Type of accommodation			
House (%)	79 (76.7)	142 (68.6)	221 (71.3)
Unit (%)	5 (4.9)	17 (6.8)	22 (7.1)
Retirement Village (%)	7 (6.8)	5 (2.4)	12 (3.9)
Hostel (%)	0(0.0)	1 (0.5)	1 (0.3)
Townhouse (%)	4 (3.9)	34 (16.4)	38 (12.3)
Granny Flat (%)	1 (0.9)	3 (1.4)	4 (1.3)
Other (%)	7 (6.8)	5 (2.4)	12 (3.9)
Number of co-residents			
0 (%)	29 (28.2)	69 (33.3)	98 (31.6)
1 (%)	66 (64.1)	119 (57.5)	185 (59.7)
2 (%)	6 (5.8)	15 (7.2)	21 (6.8)
3 or more (%)	2 (1.9)	4 (1.9)	6 (1.9)
Age of leaving school			
14 or younger (%)	23 (22.3)	33 (16.0)	56 (18.1)
15 (%)	27 (26.2)	42 (20.4)	69 (22.3)
16 or older (%)	53 (51.5)	131 (63.6)	184 (59.6)
Obtained a qualification			
Yes (%)	65 (63.1)	149 (72.0)	214 (69.0)
No (%)	38 (36.9)	58 (28.0)	96 (31.0)
Current employment status			
Employed (%)	11 (10.7)	20 (9.6)	31 (10.0)
Retired (%)	77 (74.8)	161 (77.8)	238 (76.8)
Other (%)	15 (14.5)	26 (12.6)	41 (13.2)

Note. Employment status includes full-time employment, part-time employment, casual employment and self-employed

4.1.2 Health characteristics

Summary statistics related to participants' self-reported levels of depression, anxiety and general self-rated health are shown in Table 2 by place of residence. On average, participants reported experiencing around two anxiety-related symptoms, while the prevalence of depressive symptoms was slightly lower. Around one quarter of participants did not report experiencing any symptoms of anxiety, while 22 percent of rural, and 34 percent of urban respondents reported that that did not experience depressive symptoms. Rural participants reported slightly poorer health on all general indices relative to urban respondents, however the differences were not statistically significant.

Table 2. Summary health statistics by place of residence

	Rural	Urban	Total
Mean Anxiety Rating (SD)	2.17 (1.95)	1.96 (1.9)	2.03 (1.92)
Mean Depression Rating (SD)	1.88 (1.62)	1.56 (1.65)	1.67 (1.64)
General Health			
Excellent (%)	18 (17.5)	51 (24.8)	69 (22.3)
Very Good (%)	37 (35.9)	71 (34.5)	108 (35.0)
Good (%)	35 (33.9)	52 (25.2)	87 (28.2)
Fair (%)	8 (7.8)	26 (12.6)	34 (11.0)
Poor (%)	5 (4.9)	6 (2.9)	11 (3.6)

4.1.3 Driver characteristics

Driver characteristics of the rural and urban respondents are presented in Table 3. Urban drivers were significantly more likely to be the only driver in their place of residence relative to rural drivers ($\chi^2(1) = 4.22, p = 0.04$). On average, participants reported that they obtained their licence in their early twenties, and had been driving

for more than 50 years. Most participants reported “Good” or “Excellent” confidence in their driving ability.

Table 3. Driver characteristics by place of residence

	Rural	Urban	Total
Only driver in residence			
Yes (%)	41 (39.8)	108 (52.2)	149 (48.1)
No (%)	62 (60.2)	99 (47.8)	161 (51.9)
Age of first driver's licence			
Range	15-45	14-55	14 – 55
Mean (SD)	21.3 (6.33)	22.65 (6.97)	22.2 (6.79)
Years of driving experience			
Range	9-78	15-78	9 – 78
Mean (SD)	56.4 (9.78)	54.5 (9.09)	55.13 (9.35)
Confidence in driving ability			
Excellent (%)	29 (28.2)	58 (28.0)	87 (28.1)
Good (%)	59 (57.3)	113 (54.6)	172 (55.5)
Average (%)	14 (13.6)	33 (15.9)	47 (15.2)
Fair (%)	1 (1.0)	2 (1.0)	3 (1.0)
Poor (%)	0 (0.0)	1 (0.5)	1 (0.3)

Key elements of respondents’ typical self-reported driving behaviour are summarised in Table 4 by place of residence. Most participants reported driving frequently with high levels of independence. Very few participants reported driving once a week or less, or never driving alone. Around three quarters of participants reported that they would drive to places that they had never been, while only around 5% reported that they only drive to places that they know well.

Table 4. Driving behaviour by place of residence

	Rural	Urban	Total
Driving Frequency			
Every day (%)	44 (42.7)	101 (48.8)	145 (46.8)
4-5 times / week (%)	36 (35.0)	65 (31.4)	101 (32.6)
2-3 times / week (%)	21 (20.4)	38 (18.4)	59 (19.0)
Once per week (%)	2 (1.9)	1 (0.5)	3 (1.0)
Less than once / week (%)	0 (0.0)	2 (1.0)	2 (0.6)
How Often Drive Alone?			
Never (%)	2 (1.9)	2 (1.0)	4 (1.3)
Occasionally (%)	20 (19.4)	33 (15.9)	53 (17.1)
Half of the time (%)	36 (35.0)	57 (27.5)	93 (30.0)
Most of the time (%)	38 (36.9)	97 (46.9)	135 (43.5)
Always (%)	7 (6.8)	18 (8.7)	25 (8.1)
Where you would drive?			
Only to places you know well (%)	5 (4.9)	12 (5.8)	17 (5.5)
To places you know well or have been 1-2 times before (%)	15 (14.7)	45 (21.7)	60 (19.4)
Places you know well, places you've been to 1-2 times, and places you have never been before (%)	82 (80.4)	150 (72.5)	232 (75.1)
If the only driver, how long a trip would you take (maximum)?			
6 or more hours (%)	62 (60.2)	113 (54.6)	175 (56.4)
4-5 hours (%)	11 (10.7)	27 (13.0)	38 (12.3)
2-3 hours (%)	18 (17.5)	41 (19.8)	59 (19.0)
1 hour or less (%)	12 (11.7)	26 (12.5)	38 (12.3)
Do you drive at night?			
Yes (%)	87 (84.5)	156 (75.4)	243 (78.4)
No (%)	16 (15.5)	51 (24.6)	67 (21.6)
Amount you drive at night?			
More than used to (%)	3 (3.4)	2 (1.3)	5 (2.1)
Less than used to (%)	63 (72.4)	97 (62.2)	160 (65.8)
About the same as used to (%)	21 (24.1)	57 (36.5)	78 (32.1)
Distance driving over 100km?			
Yes (%)	86 (83.5)	144 (69.6)	230 (74.2)
No (%)	17 (16.5)	63 (30.4)	80 (25.8)
How many times per year do you drive over 100km?			
Mean (SD)	17.75 (25.93)	9.71 (12.46)	12.69 (18.96)

Evidence for older adults' changing their driving behaviour emerged in relation to items concerned with driving at night. Overall, around one fifth of respondents reported that they do not drive at night. Urban drivers were more likely to report not driving at night relative to rural drivers, with this difference approaching significance ($\chi^2(1) = 3.37, p = 0.07$). Most drivers reported driving at night less frequently than they used to, with a trend towards rural drivers being more likely to reduce their levels of night driving relative to urban drivers ($\chi^2(2) = 4.84, p = 0.09$). Not surprisingly, rural drivers reported a greater frequency of driving distances in excess of 100 kilometres relative to urban drivers ($\chi^2(1) = 6.97, p = 0.008$).

4.2 Health-related knowledge relevant to driving

4.2.1 Medical conditions

Participants were asked a series of questions related to their perceptions regarding the effects of medical conditions on driving, their own experiences of medical conditions, and sources of information on medical conditions related to driving. Results pertaining to the perceived influences of medical conditions on driving are reported separately in relation to conditions that might be regarded as having a higher or lower likelihood of affecting safety. Figure 1 shows the proportions of respondents who recognised the capacity for higher risk conditions to affect driving, by place of residence. The higher risk conditions were recognised by a majority of respondents as having the capacity to adversely affect driving safety. Around 80% or more of respondents indicated that they recognised the potential for heart conditions, dementia, and macular degeneration to affect an individual's capacity to drive safely by providing a response of "Yes", or the more qualified (but perhaps equally valid) "Depends on the circumstances". Around 70% or more of respondents in all groups also endorsed arthritis, stroke, cataract, glaucoma and depression as having the capacity to affect driving.

While the potential effects of these conditions were recognised by a majority of participants, it was significant that a substantial proportion of participants indicated that they did not believe the conditions would effect driving. For example, more than 10% of respondents did not believe that early stage dementia would impact on driving, while more than 20% of respondents indicated that they either did not believe that glaucoma would affect driving, or did not know whether it would have an impact. Rural and urban participants generally endorsed the potential impact of different conditions at similar rates, with chi-squared analyses revealing no significant differences with regard to conditions with a higher likelihood of affecting driving.

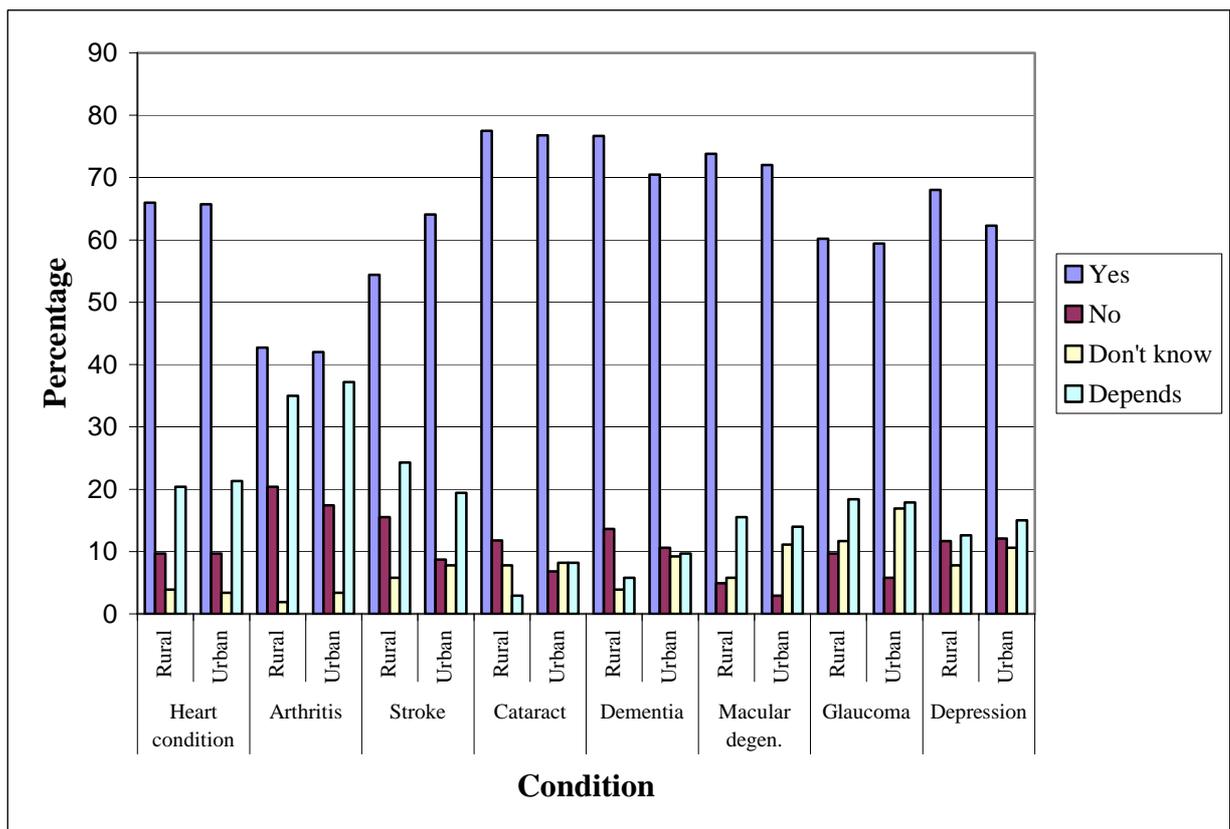


Figure 1. Endorsement of conditions with higher potential to affect driving safety by place of residence

Additional analyses were conducted to determine whether older and younger participants differed in their health related knowledge regarding higher risk medical conditions. Given relatively low numbers of ‘oldest-old’ (aged 85+) drivers in the current sample, we compared drivers aged 65 to 74 with those aged 75 and older. Significant age differences emerged in participants’ evaluations of the capacity for cataracts to affect driving, with the older group more likely to indicate that cataracts would not affect driving (11.7%) relative to the younger group (3.3%, $\chi^2(2) = 6.82, p = 0.033$). A significant age difference was also evident with regard to macular degeneration, while none of the younger group expressed the belief that this condition would not affect driving, 11 (5.8%) of the older group expressed this belief ($\chi^2(2) = 7.56, p = 0.023$).

Responses made in relation to medical conditions that have a lower capacity to impact on driving are summarised in Figure 2. More than 60% of respondents indicated that diabetes controlled by medication, dermatitis and varicose veins would not affect driving capacity. However there was less certainty regarding the potential influence of epilepsy controlled by medication, and asthma/bronchitis on driving safety. Over 30% of respondents believed that epilepsy controlled by medication could affect driving, with a substantial minority of around 15% indicating that they did not know of its potential effects. The mixed responses given with reference to asthma/bronchitis are represented in the relatively high proportion of participants who endorsed the “Depends” category, and reflect recognition among participants of the risks to driving being dependent on the severity of the condition and/or whether the individual might be subject to an acute asthma ‘attack’ while driving.

Several differences were observed in the responses given by urban and rural participants in reference to conditions with a lower probability of impacting on driving. Rural participants were more likely to endorse asthma/bronchitis as a potential risk factor ($\chi^2(3) = 8.05, p = 0.045$), and more likely to report not knowing whether varicose veins could affect driving ($\chi^2(3) = 7.27, p = 0.064$). Urban drivers were more likely to indicate that the capacity for epilepsy controlled by medication to

affect driving was dependent on the individual circumstances relative to their rural counterparts, who were more likely to report not knowing of its potential influence ($\chi^2(3) = 7.74, p = 0.052$). No age differences were evident with regard to beliefs expressed regarding the capacity for the lower risk conditions to affect driving.

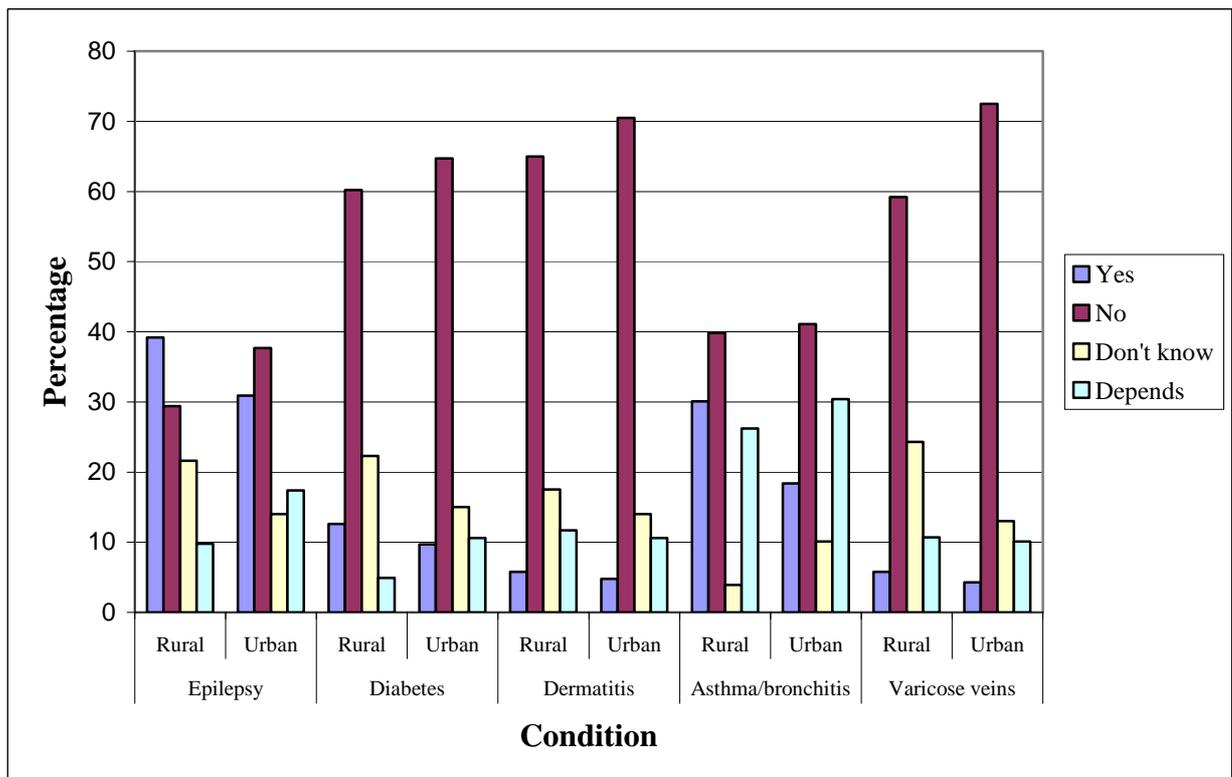


Figure 2. Endorsement of conditions with lower potential to affect driving safety by place of residence

The proportion of drivers who reported experiencing specific medical conditions is shown in Table 5. Less than 10% of drivers reported having experienced a stroke, while around 15% and 22% of participants reported having experienced joint pain or a heart condition respectively. Eye conditions were more common with almost half of participants having experienced an eye condition either currently, or in the past.

Table 5. Experience of medical conditions by place of residence

	Rural	Urban	Total
Suffer from an eye condition?			
No (%)	59 (57.3)	106 (51.2)	165 (53.2)
Yes - current (%)	19 (18.4)	37 (17.9)	56 (18.1)
Yes – past (%)	25 (24.3)	64 (30.9)	89 (28.7)
Suffered a stroke?			
No (%)	93 (90.3)	193 (93.2)	286 (92.3)
Yes (%)	10 (9.7)	14 (6.8)	24 (7.7)
Suffer from arthritis, stiffness, joint pain?			
No (%)	85 (83.3)	178 (86.0)	263 (85.1)
Yes (%)	17 (16.7)	29 (14.0)	46 (14.9)
Heart condition or heart attack?			
No (%)	78 (75.7)	163 (78.7)	241 (77.7)
Yes (%)	25 (24.3)	44 (21.3)	69 (22.3)

In addition to exploring older adults' general health knowledge related to driving, a key question was concerned with **the extent to which knowledge regarding a given medical condition was contingent upon having experienced that condition.** Among participants who had experienced an eye condition in the past, or who currently experienced such a condition, there was a trend towards being less likely to report not knowing whether cataracts could affect driving (4.9%), relative to those who did not report having an eye condition (10.9%, $\chi^2 (2) = 5.82, p = 0.055$). There was also an association between experience of a heart condition and related knowledge, with participants who had experienced a heart attack or heart condition more likely to indicate that this would not affect driving (24.6%), relative to those who had not experienced a heart condition (5.4%, $\chi^2 (2) = 25.01, p < 0.001$).

Participants who reported having experienced one of the relevant medical conditions were also asked whether they had received advice from their doctor

regarding the potential impact of the condition on driving. The proportions of participants who reported receiving advice are shown in Figure 3. Most participants reported that they had not received such advice. Higher proportions of urban drivers reported that they had received driving-related advice pertaining to an eye condition or stroke relative to rural participants, however these differences were not statistically significant.

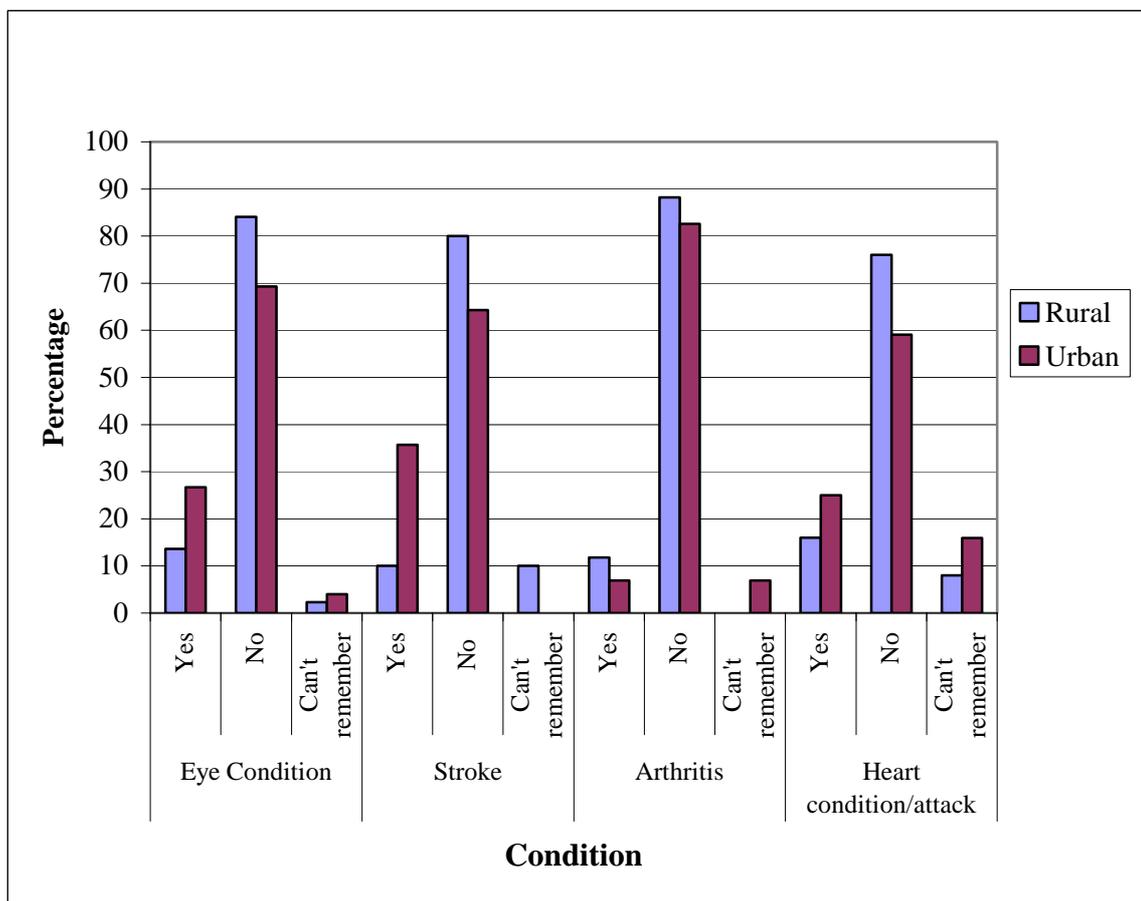


Figure 3. Percentages of respondents receiving driving-related advice from their doctor relevant to medical conditions

Finally, participants who reported the experience of a medical condition were asked if they had adapted their driving behaviour as a result. Relevant percentages are shown in Figure 4, by place of residence. Around half of participants from both rural

and urban areas who experienced arthritis, stiffness or joint pain reported having adapted their driving in response to the condition. Less than half of participants who had experienced an eye condition, heart condition or stroke reported having adapted their behaviour. A lower proportion of urban participants adapted their driving in response to eye condition and stroke, while a lower percentage of rural drivers adapted their driving in response to experiencing a heart condition, however comparisons by place of residence were not statistically significant.

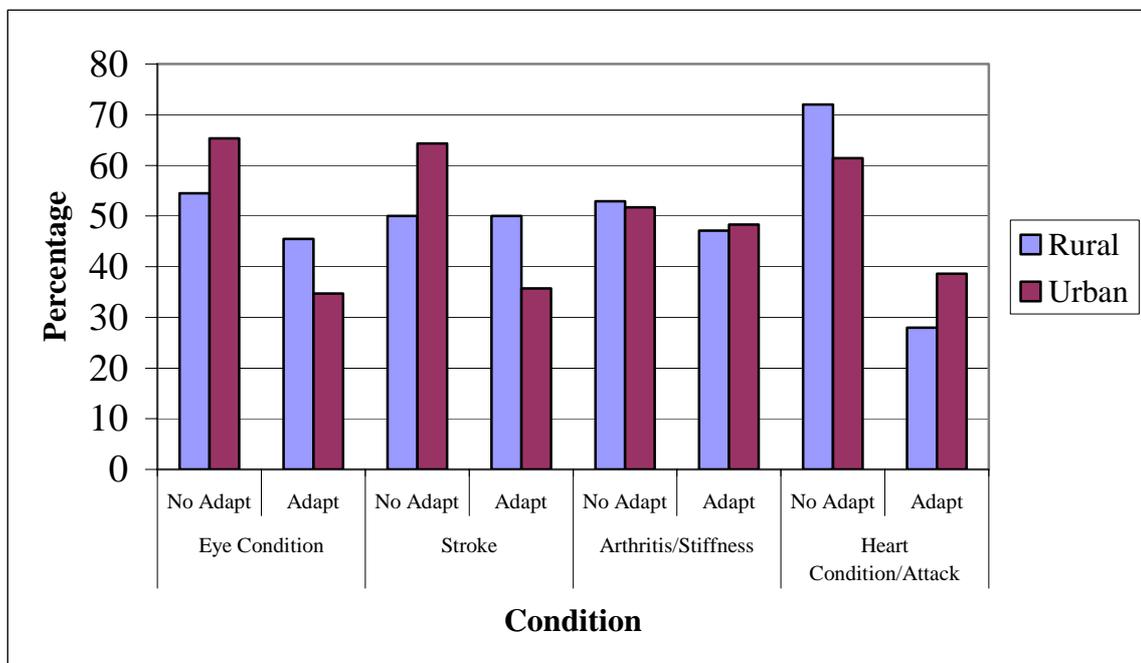


Figure 4. Percentage of respondents who changed driving behaviour due to the experience of medical conditions

4.2.2 Medication use

Knowledge regarding medication use was assessed by asking participants to indicate which medications, from a list provided, could affect driving safety. Relevant results for medications with a higher and lower likelihood of affecting driving are shown in Figures 5 and 6 respectively.

The majority of respondents (over 60%) recognised the capacity for sleep medication and a combination of sleep and anxiety/depression medication to affect driving. Respondents were less certain about the potential effects of medication for depression or anxiety, with less than half of participants endorsing a potential effect, and over 30% of respondents indicating that they did not know whether medications of this type could affect driving. The most striking pattern of responses emerged in reference to antihistamines not defined as ‘non-drowsy’ where more than half of respondents reported the belief that medications of this type would not affect driving. It was also notable that more than one-fifth of respondents did not know whether the combination of sleep and depression/anxiety medication could affect driving.

Only one age difference emerged with regard to knowledge of medications likely to affect driving. Older drivers were more likely to report not knowing whether antihistamines could affect driving (47.6%) relative to younger drivers (18.2%), the majority of whom (67.8%) recognised the capacity for this medication to influence safety ($\chi^2(2) = 25.01, p < 0.001$).

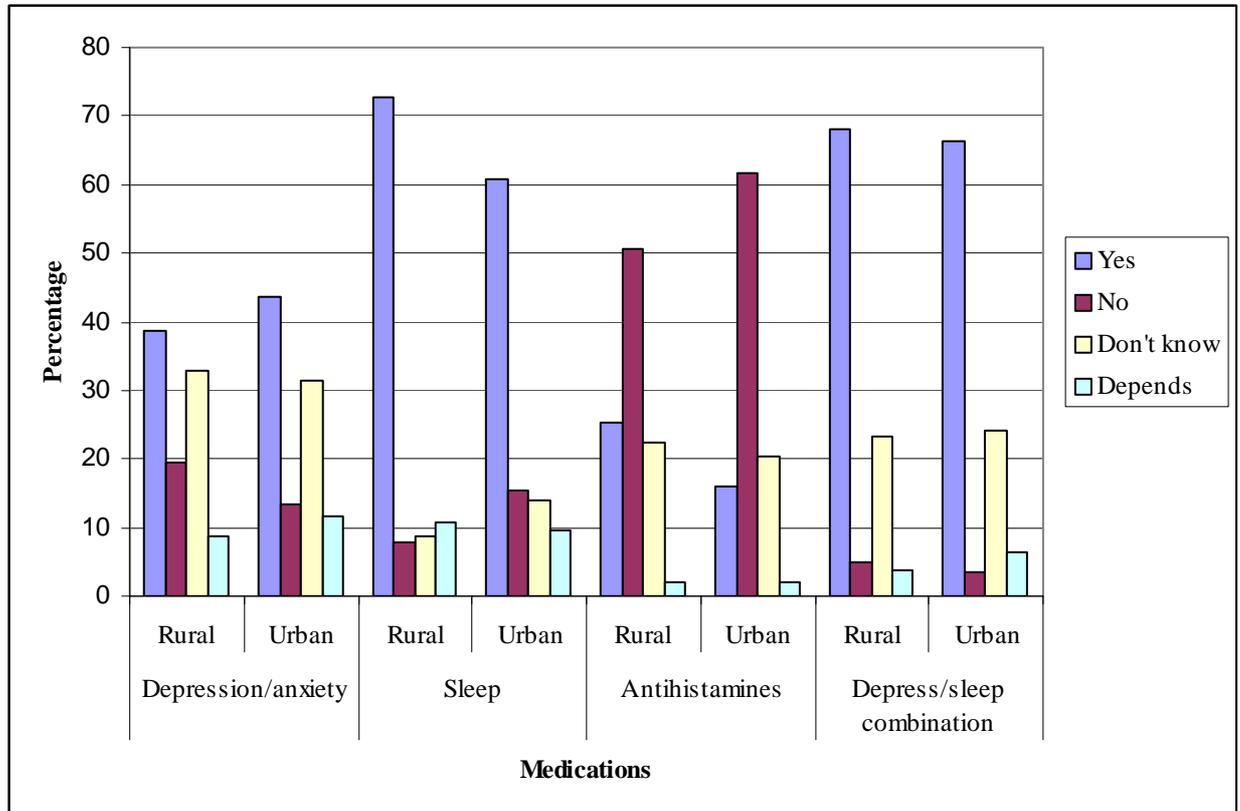


Figure 5. Endorsement of medications with higher potential to affect driving safety by place of residence

As shown in Figure 6, over 50% of respondents indicated that medications for blood pressure, anti-inflammatories and non-drowsy antihistamines would not influence driving safety. However responses made in reference to the lower risk medications were characterised by a relatively high level of uncertainty, with 20% or more participants reporting that they did not know whether use of each medication had the capacity to affect driving. No significant differences by place of residence emerged in response to the potential influence of the lower risk medications on driving safety.

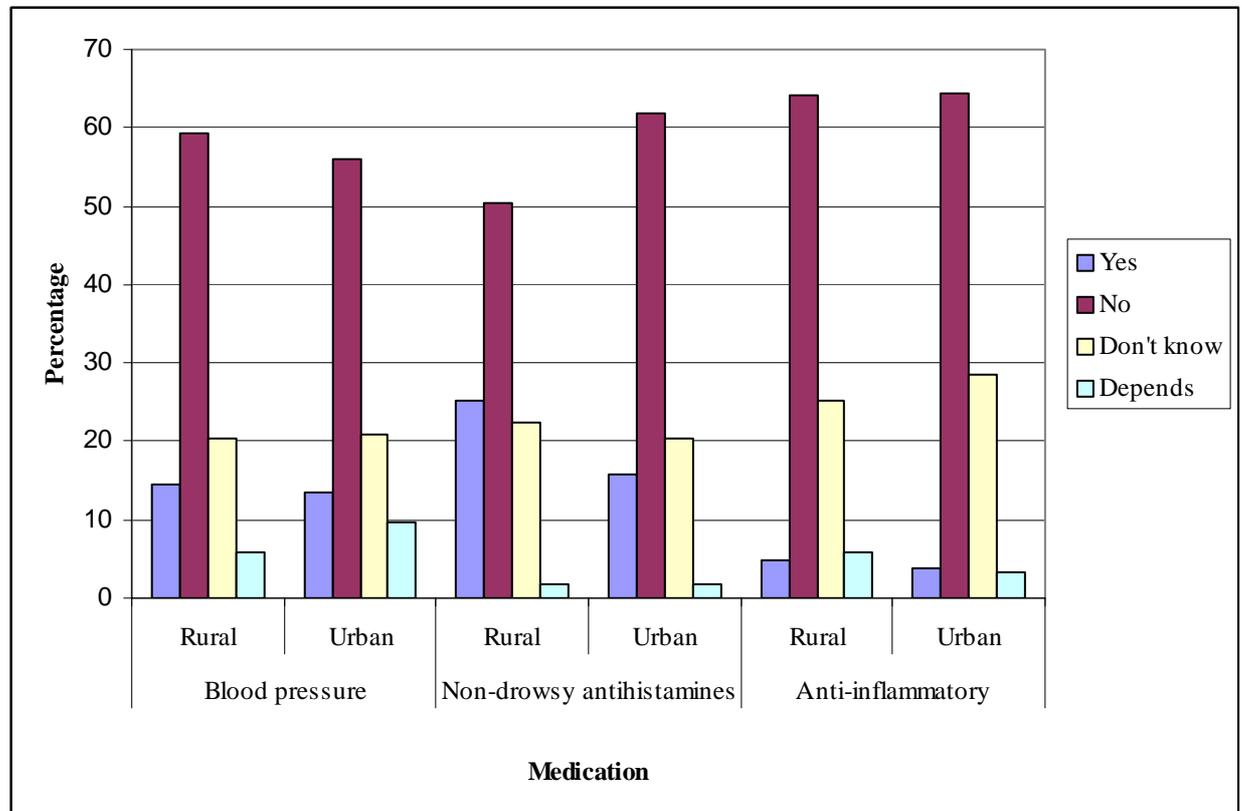


Figure 6. Endorsement of medications with lower potential to affect driving safety by place of residence

Percentages of participants who had previously used, or who were currently using sleep medication, or medication for depression and anxiety are shown in Table 6. Similar percentages of respondents (around 6.5%) reported taking sleep medication and medication for depression or anxiety. Urban and rural respondents did not differ in their reported medication use.

Table 6. Percentage of participants taking medication currently or in the past

	Rural	Urban	Total
Sleep medication			
No (%)	96 (93.2)	194 (93.7)	290 (93.5)
Yes (%)	7 (6.8)	13 (6.3)	20 (6.5)

Medication for depression or anxiety			
No (%)	97 (94.2)	193 (93.2)	290 (93.5)
Yes (%)	6 (5.8)	14 (6.8)	20 (6.5)

Participants taking medication for sleep were no more likely than others to be aware of the potential impact of this medication on driving. However participants taking medication for depression or anxiety were less likely to report not being aware of the potential effects of this medication (10.0%) relative to others (31.3%) with this association approaching significance ($\chi^2(2) = 5.10, p = 0.078$).

Participants taking medication were also asked whether their doctor had provided advice related to the potential effects of the medication on driving. Given the low numbers of respondents currently taking these medications, results are not stratified by place of residence. Of those taking sleep medication, 6 (30%) reported that they had received advice related to driving from their doctor, while 4 (1.3%) reported that they had received such advice from their pharmacist. Of those taking medication for depression or anxiety, 7 (39%) reported receiving information from their doctor, and 7 (39%) reported receiving information from their pharmacist.

Participants were also asked to identify where they would seek out information if they wanted to know whether a medical condition or medication would affect driving. Relevant results are shown in Figure 7. Over 70% of respondents indicated that they would seek information from a general practitioner. The next most frequently identified source of information was a pharmacist, at around 24% for rural, and 29% for urban participants. Around 10% of participants indicated that they would seek information from the internet, or from medication packaging.

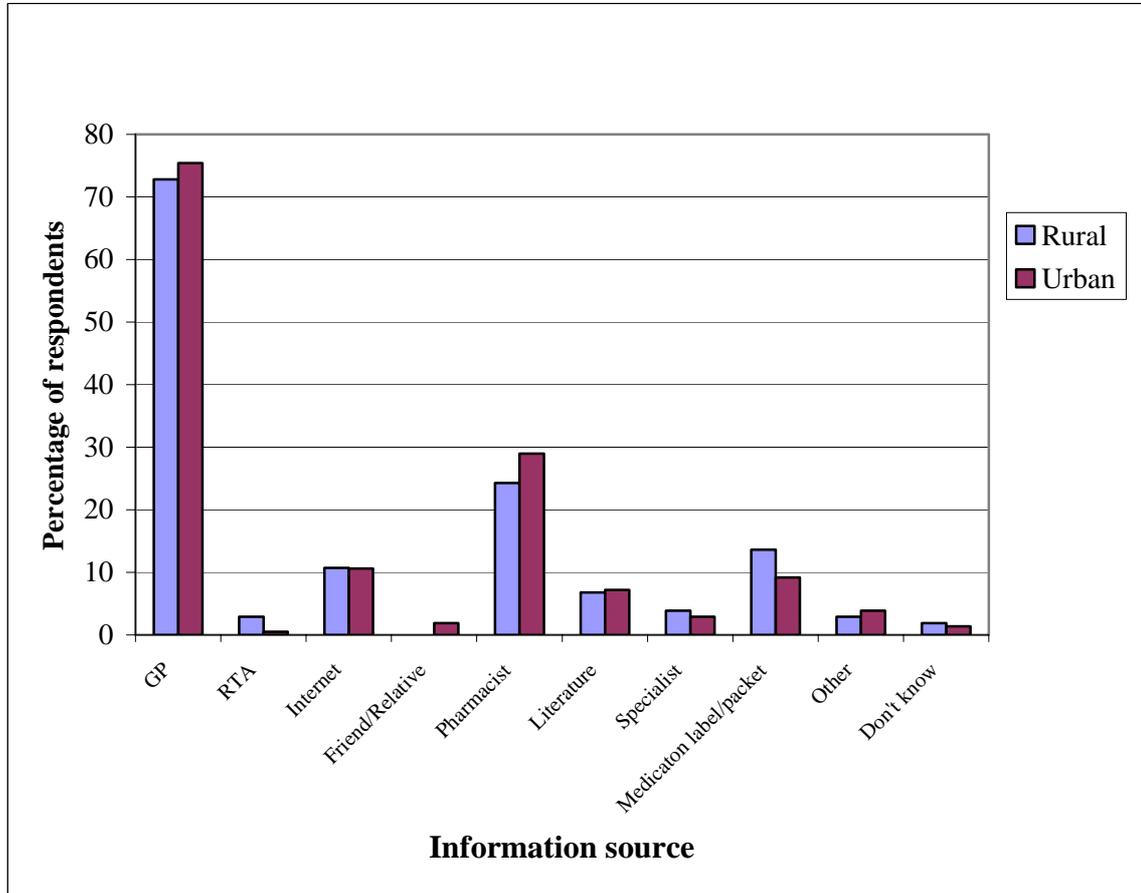


Figure 7. Preferred sources of information related to medical conditions/medications and driving safety

4.3 Anxiety related to driving

4.3.1 Experience of driving-related anxiety by place of residence

Table 7 shows the percentages of rural and urban residents who reported experiencing driving-related anxiety from different sources either “Never”, “Rarely/sometimes”, or “Often/very often”. Relatively few respondents reported concerns about medication or memory affecting driving, with around 20% of participants reporting at least some concerns related to general health, and slightly higher proportions of participants reporting concerns related to their eyesight or feelings affecting driving at least rarely. Around 30% of participants reported at least

rare concerns regarding their driving ability. Very few participants reported worrying often or very often about personal factors that could affect driving. In contrast, concerns regarding the behaviour of other drivers were much more prevalent, with only around 15% of participants indicating that they never worry about other drivers, and 49% and 37% of rural and urban drivers respectively reporting that they worry about the behaviour of other drivers “Often” or “Very often”.

While few participants reported more than occasional worry or concern regarding personal attributes that could impact on driving safety, somewhat higher percentages of respondents reported having adapted their behaviour in response to driving-related concerns. Twelve percent of rural respondents and 22% of urban respondents indicated that they avoid driving at night “Often” or “Very often”. Over 30% of participants reported that driving-related concerns result in their avoiding driving in wet conditions under some circumstances, while around 13% of rural and 18% of urban participants reported avoiding turning right at an intersection at least occasionally. Around 36% of rural, and 44% of urban participants reported avoiding driving on unfamiliar roads at least occasionally as a result of driving-related concerns.

A final group of questions concerned with driving-related anxiety assessed the extent to which concerns about driving impacted on participants’ lifestyles and behaviours outside of the driving context. Very few participants indicated that driving-related worries had a broader impact on their lifestyle. The most frequently identified restriction was related to social engagement, with around 12% of rural drivers and 19% of urban drivers indicating that they at least occasionally did not attend social events because of driving-related concerns.

Chi-square analyses revealed a trend towards a significant difference between rural and urban drivers with regard to the frequency with which they reported avoiding night driving. Results indicated that urban drivers were more likely to reduce the extent to which they drove at night in response to driving related concerns relative to rural drivers ($\chi^2(2) = 5.81, p = 0.06$). While the low frequencies of participants caution against over-interpretation of the data, it was also noteworthy that 7 urban

participants (3.4%) reported that they occasionally did not attend medical appointments because of driving related concerns, while no rural respondents indicated that driving-related concerns stopped them from attending medical appointments.

4.3.2 Experience of anxiety by gender

Gender differences in the experience of driving-related anxiety are shown in Table 8. Chi-squared analyses indicated that females were significantly more likely than males to reduce their driving on unfamiliar roads relative to males ($\chi^2 (2) = 7.67$, $p = 0.02$). There were also trends towards females being more likely to reduce night driving ($\chi^2 (2) = 4.79$, $p = 0.09$), and to be more likely to avoid running errands as a result of driving related concerns relative to males ($\chi^2 (1) = 3.74$, $p = 0.05$).

4.3.3 Experience of anxiety by age

Age differences in the experience of driving-related anxiety are shown in Table 9. Drivers aged 75 and older were more likely to reduce their night driving in response to concerns relative to those aged 65 to 74 ($\chi^2 (2) = 15.13$, $p = 0.001$). There were also trends towards older drivers being more likely to reduce their engagement in social activities ($\chi^2 (2) = 4.86$, $p = 0.09$), and to stop running errands ($\chi^2 (1) = 2.90$, $p = 0.09$) in response to driving-related worries relative to their younger counterparts.

Table 7. Experience of driving-related anxiety by place of residence

	Rural			Urban		
	Never	Rarely/sometimes	Often/very often	Never	Rarely/sometimes	Often/very often
Specific sources of concern						
Worry about health affecting ability to drive safely	77.7	21.4	1.0	76.8	22.3	1.0
Worry about medication affecting ability to drive safely	96.1	3.9	0.0	91.8	7.2	1.0
Worry about eyesight affecting ability to drive safely	72.8	26.2	1.0	72.0	25.1	2.9
Worry about memory affecting ability to drive safely	92.2	6.8	1.0	84.5	14.5	1.0
Worry about feelings affecting ability to drive safely	77.7	22.4	0.0	69.6	27.5	2.9
Worry about driving ability	67.6	30.3	2.0	62.6	32.5	4.8
Worry about behaviour of other drivers	14.6	36.9	48.6	14.5	48.3	37.2

	None	Little/some	Often/very often	None	Little/some	Often/very often
Change of driving behaviour in response to concerns						
Avoid driving at night	55.3	33.1	11.6	44.4	33.3	22.2
Avoid driving in wet conditions	68.9	29.1	2.0	63.3	31.4	5.3
Avoid turning right at an intersection	87.4	10.7	2.0	82.0	16.0	2.0
Avoid driving on unfamiliar roads	64.1	29.1	6.8	56.5	37.2	6.3
Broad restriction of behaviour as a result of concerns						
Stop you from taking part in social activities	88.2	11.8	0.0	81.2	16.5	2.4
Stop you from running errands	96.1	3.9	0.0	96.6	3.4	0.0
Stop you from participating in paid or volunteer work	97.1	2.9	0.0	94.7	4.3	0.0
Stop you from attending medical appointments	100	0.0	0.0	96.6	3.4	0.0
Stop you from getting a good night's sleep	96.1	3.9	0.0	97.6	2.4	0.0

Table 8. Experience of driving-related anxiety by gender

	All			Male			Female		
	Never	Rarely/ sometimes	Often/very often	Never	Rarely/ sometimes	Often/very Often	Never	Rarely/ sometimes	Often/very often
Specific sources of concern									
Worry about health affecting ability to drive safely	77.1	21.9	0.9	77.8	21.7	0.5	75.9	22.4	1.8
Worry about medication affecting ability to drive safely	93.2	6.1	0.6	92.9	7.1	0.0	93.8	4.5	1.8
Worry about eyesight affecting ability to drive safely	72.3	25.4	2.2	74.2	24.7	1.0	68.8	26.8	4.5
Worry about memory affecting ability to drive safely	87.1	11.9	1.0	87.4	11.6	1.0	86.6	12.5	0.9
Worry about feelings affecting ability to drive safely	72.3	25.8	1.9	72.2	26.3	1.5	72.3	25.0	2.7
Worry about driving ability	64.3	31.9	3.9	65.2	31.8	3.0	62.7	31.8	5.4
Worry about behaviour of other drivers	14.5	44.5	41.0	13.6	47.5	38.9	16.1	39.3	44.7

	None	Little/some	Most/All	None	Little/some	Most/all	None	Little/some	Most/all
Change of driving behaviour in response to concerns									
Avoid driving at night	48.1	33.2	18.7	51.0	33.9	15.2	42.9	32.2	25.0
Avoid driving in wet conditions	65.2	30.7	4.2	67.2	28.3	4.5	61.6	34.9	3.6
Avoid turning right at an intersection	83.5	14.2	1.9	84.3	13.2	2.5	83.0	16.1	0.9
Avoid driving on unfamiliar roads	59.0	34.5	6.5	63.6	32.3	4.0	50.9	38.4	10.7
Broad restriction of behaviour as a result of concerns									
Stop you from taking part in social activities	83.2	14.9	1.6	83.3	14.7	1.5	83.0	15.2	1.8
Stop you from running errands	96.5	3.5	0.0	98.0	2.0	0.0	93.8	6.3	0.0
Stop you from participating in paid or volunteer work	95.5	3.9	0.6	95.5	3.5	1.0	95.5	4.5	0.0
Stop you from attending medical appointments	97.7	2.3	0.0	97.0	3.0	0.0	99.1	0.9	0.0
Stop you from getting a good night's sleep	97.1	2.9	0.0	96.0	4.0	0.0	99.1	0.9	0.0

Table 9. Experience of driving-related anxiety by age

Specific sources of concern	65-74 years			75+ years		
	Never	Rarely/sometimes	Often/very often	Never	Rarely/sometimes	Often/very often
Worry about health affecting ability to drive safely	74.4	24.0	1.6	78.8	20.6	0.5
Worry about medication affecting ability to drive safely	90.1	8.3	1.7	95.2	4.8	0.0
Worry about eyesight affecting ability to drive safely	70.2	27.3	2.5	73.5	24.3	2.1
Worry about memory affecting ability to drive safely	89.3	10.0	0.8	85.7	13.3	1.1
Worry about feelings affecting ability to drive safely	66.9	29.7	3.3	75.7	23.3	1.0
Worry about driving ability	62.0	33.0	5.0	65.8	31.1	3.2
Worry about behaviour of other drivers	14.9	43.0	42.1	14.3	45.5	40.2

	None	Little/some	Often/very often	None	Little/some	Often/very often
Change of driving behaviour in response to concerns						
Avoid driving at night	60.3	29.7	9.9	40.2	35.5	24.4
Avoid driving in wet conditions	65.3	33.0	1.7	65.1	29.1	5.8
Avoid turning right at an intersection	83.5	14.0	2.5	84.0	14.4	1.6
Avoid driving on unfamiliar roads	61.2	32.2	6.6	57.7	36.0	6.3
Broad restriction of behaviour as a result of concerns						
Stop you from taking part in social activities	89.3	9.9	0.8	79.8	18.1	2.1
Stop you from running errands	94.2	5.8	0.0	97.9	2.1	0.0
Stop you from participating in paid or volunteer work	94.2	5.0	0.8	96.3	3.2	0.5
Stop you from attending medical appointments	98.3	1.7	0.0	97.4	2.6	0.0
Stop you from getting a good night's sleep	98.3	1.7	0.0	96.3	3.7	0.0

4.3.4 Relationships between driving-related health knowledge and driving related anxiety

An index of uncertainty, or lack of knowledge related to the impact of medical conditions on driving was constructed by summing the number of ‘uncertain’ responses provided by participants in relation to each of the medical conditions specified in Section 4.2.1. This index was correlated with the driving-related anxiety item concerned with worries about health affecting the ability to drive safely, with Spearman’s Rho revealing a weak, non-significant positive association ($r = .07$).

An equivalent index of uncertainty regarding the impact of medication on driving was correlated with the anxiety item assessing medication-related worries concerned with driving. A significant negative association was revealed ($r = -.15, p = .01$), indicating that participants who more frequently reported being unaware of the effects of medication were typically less concerned about the effects of medications on their own driving.

4.3.5 Driving cessation-related anxiety

Participants were asked to indicate how often they worried about the prospect of having to give up driving in the future as a result of health-related concerns. Percentages of participants who reported experiencing such concerns “Never”, “Rarely”, “Often” or “Very often” are shown by place of residence in Figure 8. The most commonly endorsed category was “Sometimes”, with around 46% of rural, and 36% of urban drivers endorsing this response. Less than 15% of respondents indicated that they worried about future driving cessation “Often” or “Very often”. Overall rural drivers expressed a greater degree of concern about the prospect of future driving cessation, however this difference was not statistically significant.

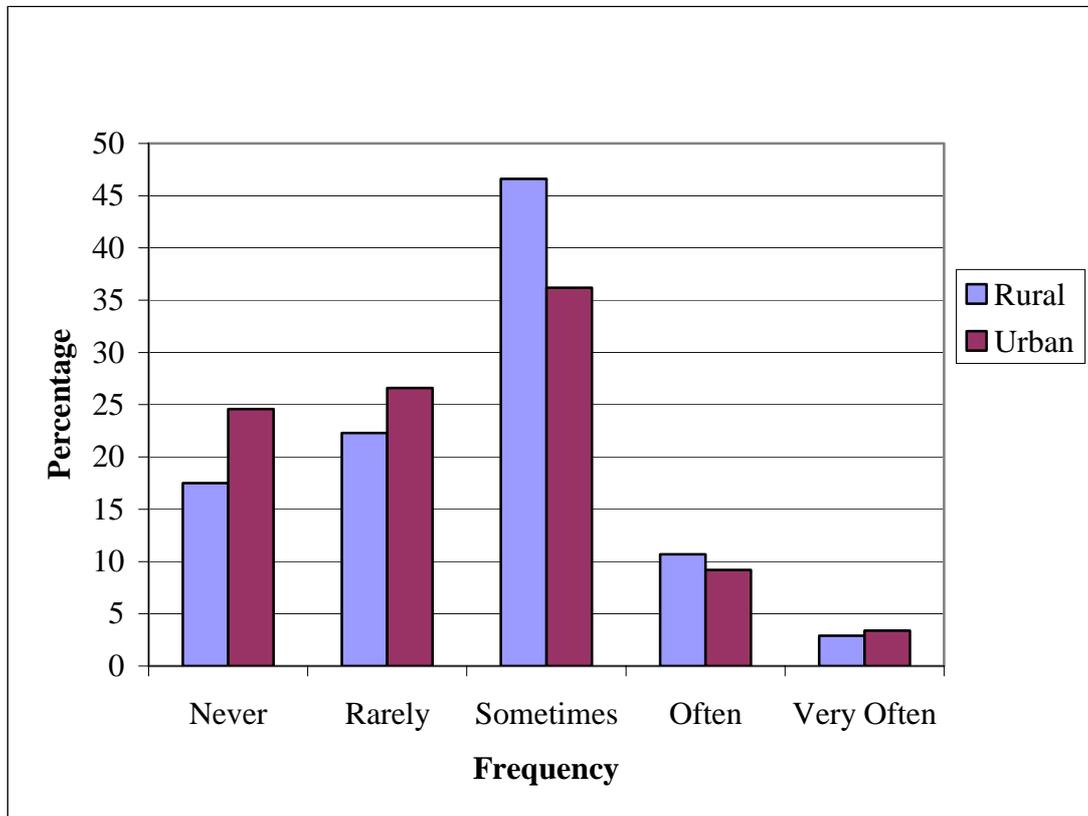


Figure 8. Frequency of worry regarding future driving cessation

Finally, participants were asked to indicate the extent to which future-driving cessation would impact on their lives using a scale of 0 to 10, with higher scores indicating greater impact. The mean scores on this scale, and the percentages of participants endorsing each score from 0 to 10 are displayed by place of residence in Table 10. Respondents typically recognised a high potential impact of driving cessation, with a score of 10 representing maximum impact the most commonly endorsed rating. On average, rural drivers perceived a greater impact of driving cessation on their lives relative to urban drivers, however the difference was not statistically significant.

Table 10. Impact of cessation for rural and urban respondents

	Rural	Urban	Total
Impact of cessation			
Mean (SD)	7.93 (2.63)	7.42 (2.84)	7.59 (2.78)
Score			
0 (%)	2 (2.0)	9 (4.3)	11 (3.6)
1 (%)		2 (1.0)	2 (0.6)
2 (%)	2 (2.0)	3 (1.4)	5 (1.6)
3 (%)	5 (5.0)	8 (3.9)	13 (4.2)
4 (%)	2 (2.0)	5 (2.4)	7 (2.3)
5 (%)	12 (11.9)	32 (15.5)	44 (14.3)
6 (%)	4 (4.0)	10 (4.8)	14 (4.5)
7 (%)	7 (6.9)	13 (6.3)	20 (6.5)
8 (%)	11 (10.9)	31 (15.0)	42 (13.6)
9 (%)	7 (6.9)	15 (7.2)	22 (7.1)
10 (%)	49 (48.5)	79 (38.2)	128 (41.6)

Note. 0-10 represent the degree of impact, higher scores indicate higher impact.

5 Summary and recommendations

5.1 Aims

The understanding older drivers have concerning health status and its potential impact on driving safety can influence self-regulation of driving and decisions concerning driving cessation. Limitations in health knowledge related to driving could also contribute to driving-related anxiety and avoidance behaviour. The aims of the present study were to determine older drivers' knowledge regarding the potential influence of health conditions and prescribed medication use on driving safety. The study also examined the extent to which older road users experienced driving-related anxiety, and related avoidance behaviours, along with worries about possible driving cessation in the future.

5.2 Driving behaviours of older adults

More than 80% of older adults were confident in their driving abilities with most rating their confidence as "Good" or "Excellent". The participants were experienced drivers with all driving for at least nine years, and with an average of over fifty years of driving experience. The majority of older adults drove to varied locations including those well known and unfamiliar, and often drove without passengers. The older adults sampled generally engaged in extensive driving, with the majority driving at least four or more days each week. Further, more than three quarters of older adults reported driving for periods of four or more hours, and were capable of distance driving of at least 100 kilometres. Not surprisingly, older adults in rural areas reported driving long distances at least 25 occasions each year, which was significantly more than their urban counterparts. In terms of challenging driving conditions, the majority of older adults continued to drive at night but most acknowledged currently engaging in less night driving than they undertook in previous years.

5.3 Health knowledge and health status related to driving in older adults

5.3.1 Health knowledge related to driving

The majority of older drivers accurately identified medical conditions likely to impact on safe driving behaviours. Over 60% of older adults believed that cardiovascular conditions were likely to compromise safe driving. More than 40% of participants believed arthritis impacted on driving safety, and around 35% noted that the relative impact of arthritis was dependent on certain circumstances. Most participants were aware that mental health and cognitive functioning could pose a risk to on-road safety. Specifically, around 65% of older adults believed that depression negatively impacts on driving safety and more than 70% of participants believed that early stage dementia could influence driving competency. However, the fact that a significant minority (approximately 25% of older drivers) either did not believe that early stage dementia posed a serious concern for driving safety, or were unsure or indicated that the potential impact of dementia was dependent upon certain circumstances indicates that further education may be required in this area. Eye disorders were consistently identified as likely to affect driving safety with more than 70% of participants recognising the potential impact of each of cataract, macular degeneration and glaucoma. Whilst this recognition rate is high, there remained a significant minority who did not indicate knowledge of the potential hazards of these common age-related eye diseases.

Participants generally showed good health knowledge regarding the lower risk health conditions with over 60% of older adults indicating that controlled diabetes, dermatitis, and varicose veins would not affect driving competency.

In summary, most of the older drivers sampled were aware of the impact of key chronic health conditions including dementia, eye conditions, arthritis and cardiovascular conditions on driving safety. Previous research indicates that these conditions can impact substantially on driving behaviours, avoidance of difficult driving situations such as night driving, and are associated with increased odds of driving cessation (Anstey et al., 2005; Brabyn, Schneck, Lott, & Haegerstrom-

Portnoy, 2005; Cranney et al., 2005; Gilhotra et al., 2001). Participants in the present study also showed a sophisticated understanding of the impact of some medical conditions on driving safety with substantial proportions indicating that the impact of a given condition is dependent on certain circumstances. A response of this type is consistent with the view that it is not solely the presence or absence of a condition that determines safety, but also individual differences in the manifestation and management of relevant associated symptoms. Recent research has produced empirical evidence in support of this view, with a study of 700 older adults with rheumatoid arthritis who were mostly current drivers (Cranney et al., 2005) indicating that the condition itself was not predictive of difficulties with driving, but rather associated disability was a key predictor of driving curtailment and cessation.

Our results generally showed similar patterns of recognition of the relevance of different conditions to driving safety among urban and rural dwelling participants. Results were also generally similar for younger and older participants, although there was some evidence to suggest that the older drivers (aged 75+) were less likely to recognise the potential impact of some eye conditions on driving relative to those aged 65 to 74. Interestingly, participants who reported having experienced a heart attack, or heart condition, were more likely to indicate that this condition would *not* impact on driving. This finding is likely to reflect the variability in individual circumstances of those experiencing chronic cardio-pulmonary conditions, and perhaps the extent to which the effects of some conditions can be experienced as relatively benign when effectively managed using appropriate medication.

5.3.2 Health status of older drivers

The majority of the older drivers sampled appeared to experience good health while 16% of participants reported having serious physical conditions including stroke and, cardiovascular, musculoskeletal and eye conditions. Specifically, 15% of older adults had arthritis or chronic pain, while 30% experienced difficulties from

cardiovascular and stroke complaints. Eye conditions were common with 18% of older drivers reporting current vision problems.

5.3.3 Medication use and health knowledge related to driving

Most respondents recognised the capacity for sleep medication alone, and in combination with psychotropic medications, to affect driving safety. Participants were less certain of the potential effects of depression and anxiety medications alone, while it was of some concern that over half of participants did not regard antihistamines as posing a potential threat to driving safety.

Of those medications identified as posing a lower risk to driving safety, more than 50% of older drivers believed that anti-inflammatory medications, non-drowsy anti-histamines and treatments for high blood pressure did not impact adversely on driving. Nonetheless, many older drivers were unsure of the impact of lower risk medication on driving safety with more than 20% uncertain of the potential influence of these treatments.

Only one age difference emerged with regard to health knowledge concerned with medication use and driving, with older drivers less certain of the potential effects of antihistamines relative to younger drivers. Use of medications was not a strong predictor of knowledge regarding their effects.

5.3.4 Sources of information for driving-related health knowledge

In the present study, approximately 16% of the older drivers identified themselves as having a chronic health condition. Only 10% of these older drivers reported that their GP specifically discussed the potential impact of their health on driving safety. Participants' experiences of receiving advice regarding medication use also appears to have been somewhat inconsistent, with only around one third of participants taking sleep medication or psychotropics reporting having received driving specific advice from their GP.

These apparent inconsistencies in provision of information are a source of some concern, given the potential risk associated with taking some prescribed opiates, sleep, antidepressant and anxiolytic medications (Del Rio & Alvarez, 2003; Jones, Holmgren, & Holmgren, 2004; Kress & Kraft, 2005; McGwin et al., 2000). Previous research indicates that 25% of older adults take a range of medications that are associated with greater risk of crash and compromised driving safety in order to manage chronic health conditions such as chronic pain, arthritis, and mental illness (McGwin et al., 2000). Research indicates that the risk these medications, particularly psychoactive medication, pose to driving safety is exacerbated by 7% of these individuals who conjunctively use alcohol (Del Rio & Alvarez, 2003). The findings highlight the importance of the role of the older driver's health practitioner or appropriate professional in ensuring that the individual is aware of any negative impact of treatment on driving safety, and any changes in driving or lifestyle behaviours needed to ensure their safety while driving.

Lack of consultation with an appropriately trained professional may partially explain why many older drivers taking medications were uncertain of the impact of medications on driving safety. Further, medications affect individuals differently and as a consequence people may be responding in terms of their own experience rather than general information about the treatment, or indeed our categories may have been too broad for respondents to be certain of the interaction between a class of medications and driving safety-not all antidepressants are the same. Responding with uncertainty or clarifying that it depends on specific circumstances may be appropriate in some contexts.

Older drivers were asked to consider their preferences for direct sources of information regarding health conditions and treatments and their potential impact on driving safety and competency. Despite few participants receiving information regarding medical conditions and driving, more than 70% reported that they would be most likely to consult their general practitioner if seeking information regarding health and driving safety. More than 25% of older drivers reported that they would

consult a pharmacist for health and driving competency information, while around 10% reported they would use the internet or the information provided with the medication.

These findings highlights discrepancies between the actual sources of information accessed by older adults and the sources from which they would prefer to receive information. The preference for GPs as a source of advice is understandable given that primary care practitioners typically oversee the health management of older adults, and if the individual has a chronic health condition the GP may provide continuing care over time that is valued by the individual. Indeed, most older adults consult their GP before embarking on a behavioural or lifestyle change which may impact on their health (Lawlor, Keen, & Neal, 1999). The discrepancy between older adults' reliance on GPs as a source of information, and the apparently inconsistent provision of this information might be addressed by the development and dissemination of high quality evidence-based information that promotes knowledge regarding health, medication use and driving behaviours; assists in making informed choices about changing driving behaviours or cessation; and minimises the burden on primary care providers and the health system generally. This type of driving-related health information is currently available from a number of sources including non-government organisations that provide information and services to older adults including the Council On The Ageing (COTA), motor vehicle organisations and allied health professionals including pharmacists and occupational therapists. Promotion of stronger partnerships between primary care and organisations such as COTA may increase the flow of information and referrals appropriate to older adults.

5.4 Driving-related anxiety

5.4.1 Driving-related anxiety in urban and rural dwelling older drivers

The majority of respondents did not report any significant driving-related concerns or anxiety, with most being comfortable with their health in terms of its

potential impact on driving safety. Nonetheless, driving-related anxiety was evident in both urban and rural dwelling participants. More than 20% of respondents reported sometimes being concerned about how their health may impact on their driving ability while less than 10% were concerned about the effects of medication on their driving ability. More than a quarter of the participants expressed that their visual ability was a cause for concern in terms of driving competency while less than 16% of participants expressed concern regarding memory. Some concern was expressed for mood with 22% of rural residents and 30% of urban dwelling older drivers reported anxiety about the impact of feelings on driving ability. Approximately one third of older drivers expressed concern regarding their own driving competency. Even more were concerned about how the behaviour of other drivers could compromise on-road safety with more than 85% of older drivers expressing concern – indeed, 41% of older adults reported often worrying about the behaviour of other drivers.

Many older drivers reported altering their driving behaviours due to driving-related anxieties. Many drivers reported that they avoided driving at night with more than half of urban dwelling respondents and 45% of rural older drivers limiting their night driving. Urban dwelling drivers tended to avoid night driving more than their rural counterparts. Around 30% of older adults avoided driving in wet conditions while fewer avoided right-hand turns at intersections which may be a reflection of the road conditions in the ACT and surrounding area where unassisted right-hand turning is not a common on-road situation. More than one-third of rural and 44% of urban participants reported avoiding driving on unfamiliar roads due to driving-related concerns, however the difference between rural and urban drivers was not significant.

The present findings are consistent with previous research regarding driving-related concerns and self-regulation. For instance, deterioration of health and vision are among the most common reasons for older drivers to modify their driving behaviour. Concerns regarding poor vision are a major factor in deciding to cease driving or engage in self-restriction especially for night driving. Difficulty seeing in the dark has been associated with major self-restriction behaviours and driving cessation (Brabyn et al., 2005; Gilhotra et al., 2001).

Most of these driving-related anxieties did not impact on the everyday functioning of older adults. Specifically, concerns about driving did not impede most people in terms of running errands, working, attending medical appointments or sleep. However, the ability to take part in social activities was impeded by driving-related anxieties for some participants with 12% of rural and 19% of urban respondents reporting some limitations to their social activities.

Around one-third of drivers expressed at least some concern regarding their own ability to drive safely. The concern of many of the drivers regarding their own driving abilities may play an important role in promoting safe driving with some research indicating that drivers who perceive their driving ability to be better than average tend to engage in more unsafe driving behaviours (Freund, Colgrove, Burke, & McLeod, 2005).

It was notable that around 15% of older adults reported that they did not engage in social activities due to driving-related anxiety. Taking part in social activities is an important aspect of mental and physical functioning (Frazer, Christensen, & Griffiths, 2005; McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003). For instance, older adults with chronic illness indicate that their major concern associated with loss of mobility was limited ability in taking part in social activities (Katz & Yelin, 2001). This lack of engagement in social activities was also significantly associated with depressive symptoms. Indeed, social isolation is a risk factor for poor mental health outcomes in older adults (Frazer et al., 2005) with mobility an important component of preventing its risk. Further, older adults who are socially isolated are less likely to engage in the regular physical activity necessary to maintain good physical health (McAuley et al., 2003). It can be seen that limiting involvement in social activities due to driving-related anxiety could potentially impact more broadly on both mental and physical health outcomes.

5.4.2 Driving-related anxiety in male and female older drivers

Some gender differences were evident in tendencies toward avoiding more difficult driving situations. Around half of female drivers compared to 36% of men reported avoiding driving on unfamiliar roads. Further, women trended to avoid driving at night with almost 60% of women compared to 49% of men limiting their night driving because of driving-related concerns. Overall, driving-related anxiety did not impact greatly on the everyday activities of most men and women. Nonetheless, it is worth mentioning that more than 15% of both men and women reported that their participation in social activities was limited due to driving-related anxieties.

It is unclear whether the increased avoidance behaviour reported by women in the present study indicates that women have better ability to self-regulate their driving behaviours than men, or that women's mobility and quality of life are unnecessarily impeded by dysfunctional driving-related concerns. Hence, the cost of compromised everyday functioning, specifically carrying out errands, may be an effective driving safety strategy for women.

5.4.3 Driving-related anxiety in young-old and old-old drivers

Older drivers were significantly more likely to actively avoid night driving compared to their younger counterparts, with 40% of younger drivers and 60% of older drivers reporting that driving-related anxiety influenced their night driving behaviours. Driving-related anxieties appeared to negatively impact on older drivers' social engagement, with 20% of older drivers compared to 10% of younger drivers reporting some limits in their ability to engage in social activities due to concerns regarding driving.

Advanced age is commonly associated with driving cessation and is a strong predictor of retiring from driving. Consistent with previous studies old-old drivers avoided higher risk situations such as night driving (Brabyn et al., 2005). As previously discussed, self-regulation is central to promoting older driver safety. Older drivers can remain safe road users for as long as possible by adapting their behaviour

to compensate for health-related limitations. However, old-old drivers were less likely to engage in some everyday tasks as evidenced by them tending not to take part in social activities or run errands. It may be that these behaviours were adaptive self-restricting behaviours but at the expense of compromising mobility and daily functioning (Gilhotra et al., 2001; Marottoli & Richardson, 1998; Persson et al., 1996).

5.4.4 Anxiety related to driving cessation

The majority of older adults were concerned about the possibility of having to give up driving some time in the future. Approximately 50% of urban and 60% of rural dwelling drivers reported that they at least sometimes worried about potential future driving cessation. Most older adults also indicated that driving cessation would have a substantially detrimental impact on their lives. There were no differences of perceived potential impact of driving cessation in terms of place of residence, gender or age, as almost all believed that the effects would be substantial.

5.5 Limitations of the study

The present study had a number of limitations that need to be considered when interpreting the findings. First, it was initially anticipated that the sample would be a randomly selected community-based sample of older drivers. However, the study had a lower than anticipated response rate to the mailed invitation to participate, and the original random sample was supplemented by a convenience sample drawn from other sources including aged community groups and print media. It is possible that volunteers from the convenience sample represented a higher functioning group than those randomly selected, however comparison of self-rated health scores did not reveal a significant difference between these groups (Mean self-rated health for randomly selected = 3.57, $SD = 1.05$; Mean self-rated health for convenience sample = 3.75, $SD = 1.07$). Of greater concern is the possibility that our relatively low

response rate resulted in an under-representation of older drivers with low confidence in their ability, or who are in poorer health. An investigation of the characteristics of non-respondents was beyond the scope of the present study, however future research into the knowledge and attitudes of older drivers could be well served by targeting higher risk groups in addition to using population-based sampling frames.

Despite health knowledge being a significant component of the present report the sample comprised few drivers who were currently experiencing significant health problems. As a consequence, several findings related to participants with medical conditions or using prescribed medications were based on low cell numbers, and consequently should be interpreted with caution.

The exclusion of ceased drivers also meant that concerns of current drivers regarding costs to quality of life could not be compared with the experiences of those who have lived with the consequences of driving cessation.

5.6 Conclusions

This report summarises the key findings of a study concerned with the extent to which older drivers' are aware of different health conditions and associated medications that can have an adverse effect on driving safety. The report is also concerned with older drivers' experiences of anxiety associated with different aspects of driving.

The findings indicate that the majority of older drivers were community dwelling, male, partnered, and retired from full-time employment. The older adults were competent drivers who drove most days of the week in a variety of circumstances.

Most older adults were aware of the key health conditions and medications that were likely to impact on driving competency. Of those with a health condition few received information regarding their condition and driving safety, and many were uncertain whether high-risk medications they were prescribed impacted on driving. Most older adults reported that they would prefer to receive information regarding driving-related health conditions from a general practitioner.

The majority of respondents did not report driving-related anxieties. However, more than 20% of respondents reported sometimes being concerned about how their health may impact on their driving ability. More than a quarter of older drivers indicated that their visual ability was a cause for concern for driving safety while less than 16% expressed concern regarding memory. Over 20% of drivers reported they were concerned that their mood may affect their ability to drive safely. Approximately one-third of respondents were concerned about their driving ability while 85% reported driving-related anxiety relating to the behaviour of other drivers.

Many drivers actively avoided challenging driving situations due to driving-related anxieties. Approximately half of the respondents reported that they avoided night driving due to driving-related anxieties. Around 30% of respondents avoided driving in wet conditions while fewer avoided right-hand turns at intersections. More

than one-third of drivers avoided unfamiliar roads because of driving-related anxiety with women significantly more vulnerable.

Overall, driving-related anxieties did not greatly impact on older drivers' everyday lives. However, around 15% of drivers reported that driving-related anxieties impeded their ability to engage in social activities with old-old drivers especially vulnerable. Women and old-old drivers trended to have more impaired independent living skills associated with mobility.

Respondents were concerned with the prospect of potential driving cessation in the future. Not surprisingly, the majority of older adults believed that driving cessation would have a significant impact on their everyday functioning.

5.7 Recommendations

A number of recommendations for health care and future research are made to promote health knowledge as it relates to driving safety, and approaches for addressing driving-related anxiety and its potential consequences on driving behaviours and everyday functioning are suggested.

Recommendations for promoting health knowledge related to driving include:

- When appropriate ensure that older drivers on prescribed medication for chronic health conditions are informed of potential effects on driving safety by appropriate health professionals and / or high quality evidenced-based materials
- Promote driving-related health knowledge through educational materials and programs that comprise high quality evidence-based information
- Promote driving-related health knowledge using dissemination strategies that minimise the burden on primary care providers
- Assist planning and informed decision making about appropriate and timely changes to driving behaviours or cessation using materials and programs that comprise high quality evidence-based information that is consumer focused.

Further research needs to be conducted to further explore considerations beyond the scope of the present study and expand on some of the current findings. It is recommended that future research should:

- Investigate optimal delivery methods for health information relevant for older drivers
- Explore in more detail the associations between driving-related anxiety and actual driving behaviours and avoidance behaviours, and how these affect everyday function and quality of life

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- Identify the small but significant minority of older adults with low levels of health literacy related to driving for targeted health promotion
- Identify the small but significant minority of older adults with driving anxiety and develop appropriate assessment and intervention for this group.

6 References

- Adler, G., Rottunda, S., Rasmussen, K., & Kuskowski, M. (2000). Caregivers dependent upon drivers with dementia. *Journal of Clinical Geropsychology*, 6(1), 83-90.
- Anstey, K. J., & Smith, G. A. (2003). Associations of biomarkers, cognition and self-reports of sensory function with self-reported driving behaviour and confidence. *Gerontology*, 49(3), 196-202.
- Anstey, K. J., Wood, J., Lord, S., & Walker, J. G. (2005). Cognitive, sensory and physical factors enabling driving safety in older adults. *Clinical Psychology Review*, 25(1), 45-65.
- Arfken, C. L., Lach, H. W., Birge, S. J., & Miller, J. P. (1994). The prevalence and correlates of fear of falling in elderly persons living in the community. *American Journal of Public Health*, 84(4), 565-570.
- Baldock, M. R., Mathias, J. L., McLean, A. J., & Berndt, A. (2006). Self-regulation of driving and its relationship to driving ability among older adults. *Accident Analysis & Prevention*, 38(5), 1038-1045.
- Brabyn, J. A., Schneck, M. E., Lott, L. A., & Haegerstrom-Portnoy, G. (2005). Night driving self-restriction: Vision function and gender differences. *Optometry and Vision Science*, 82(8), 755-764.
- Brunnauer, A., & Laux, G. (2003). Driving capacity and antidepressive drugs. *Psychiatrische Praxis*, 30(2), S102-105.
- Buck, D., Godfrey, C., & Morgan, A. (1997). The contribution of health promotion to meeting health targets: Questions of measurement, attribution and responsibility. *Health Promotion International*, 12(3), 239-250.
- Carr, D. B., Duchek, J. M., Meuser, T. M., & Morris, J. C. (2006). Older adult drivers with cognitive impairment. *American Family Physician*, 73(6), 1029-1034.
- Carr, D. B., Flood, K. L., Steger-May, K., Schechtman, K. B., & Binder, E. F. (2006). Characteristics of frail older adult drivers. *Journal of the American Geriatrics Society*, 54(7), 1125-1129.
- Cranney, A. B., Harrison, A., Ruhland, L., Vaidyanath, C., Graham, I., Man-Son-Hing, M., et al. (2005). Driving problems in patients with rheumatoid arthritis. *Journal of Rheumatology*, 32(12), 2337-2342.
- Davis, T. C., Gazmararian, J., & Kennen, E. M. (2006). Approaches to improving health literacy: Lessons from the field. *Journal of Health Communication*, 11(6), 551-554.
- Del Rio, M. C., & Alvarez, F. J. (2003). Medication and fitness to drive. *Pharmacoepidemiology and Drug Safety*, 12(5), 389-394.

- Dellinger, A., Sehgal, M., & Sleet, D. (2001). Driving cessation: What former older drivers tell us. *Journal of the American Geriatrics Society*, 49, 431-435.
- Fink, A., Beck, J. C., & Wittrock, M. C. (2001). Informing older adults about non-hazardous, hazardous, and harmful alcohol use. *Patient Education & Counseling*, 45(2), 133-141.
- Fonda, S. J., Wallace, R. B., & Herzog, A. R. (2001). Changes in driving patterns and worsening depressive symptoms among older adults. *Journals of Gerontology: Series B: Psychological Science and Social Science*, 56(6), S343-351.
- Frazer, C. J., Christensen, H., & Griffiths, K. M. (2005). Effectiveness of treatments for depression in older people. *Medical Journal of Australia*, 182(12), 627-632.
- Freeman, E. E., Grange, S. J., Munoz, B., & West, S. K. (2006). Driving status and risk of entry into long-term care in older adults. *American Journal of Public Health*, 96(7), 1254-1259.
- Freeman, E. E., Munoz, B., Turano, K. A., & West, S. K. (2005). Measures of visual function and time to driving cessation in older adults. *Optometry and Vision Science*, 82(8), 765-773.
- Freund, B., Colgrove, L. A., Burke, B. L., & McLeod, R. (2005). Self-rated driving performance among elderly drivers referred for driving evaluation. *Accident Analysis and Prevention*, 37(4), 613-618.
- Gilhotra, J. S., Mitchell, P., Ivers, R., & Cumming, R. G. (2001). Impaired vision and other factors associated with driving cessation in the elderly: the Blue Mountains Eye Study. *Clinical & Experimental Ophthalmology*, 29(3), 104-107.
- Goldberg, D., Bridges, K., Duncan-Jones, P., & Grayson, D. (1988). Detecting anxiety and depression in general medical settings. *British Medical Journal*, 297(6653), 897-899.
- Hakamies-Blomqvist, L. (1994). Compensation in older drivers as reflected in their fatal accidents. *Accident Analysis & Prevention*, 26, 107-112.
- Harsch, I. A., Stocker, S., Radespiel-Troger, M., Hahn, E. G., Konturek, P. C., Ficker, J. H., et al. (2002). Traffic hypoglycaemias and accidents in patients with diabetes mellitus treated with different antidiabetic regimens. *Journal of Internal Medicine*, 252(4), 352-360.
- Howland, J., Peterson, E. W., Levin, W. C., Fried, L., Pordon, D., & Bak, S. (1993). Fear of falling among the community-dwelling elderly. *Journal of Aging and Health*, 5(2), 229-243.
- Jones, A. W., Holmgren, A., & Holmgren, P. (2004). High concentrations of diazepam and nordiazepam in blood of impaired drivers: Association with age, gender and spectrum of other drugs present. *Forensic Science International*, 146(1), 1-7.

- Katz, P., & Yelin, E. (2001). Activity loss and the onset of depressive symptoms: Do some activities matter more than others? *Arthritis & Rheumatism*, 44(5), 1194-1202.
- Kress, H. G., & Kraft, B. (2005). Opioid medication and driving ability. *European Journal of Pain*, 9, 141-144.
- Lam, L. T., & Lam, M. K. P. (2005). The association between sudden illness and motor vehicle crash mortality and injury among older drivers in NSW, Australia. *Accident Analysis & Prevention*, 37, 563-567.
- Langford, J., Methorst, R., & Hakamies-Blomqvist, L. (2006). Older drivers do not have a high crash risk - a replication of low mileage bias. *Accident Analysis & Prevention*, 38(3), 574-578.
- Lawlor, D. A., Keen, S., & Neal, R. D. (1999). Increasing population levels of physical activity through primary care: GPs' knowledge, attitudes and self-reported practice. *Family Practice*, 16(3), 250-254.
- Lawrence, R. H., Tennstedt, S. L., & Kasten, L. E. (1998). Intensity and correlates of fear of falling and hurting oneself in the next year. *Journal of Aging & Health*, 10(3), 267-286.
- Letgers, K. (2002). Fear of falling. *Physical Therapy*, 82, 264-272.
- Lyman, S., Ferguson, S. A., Braver, E. R., & Williams, A. F. (2002). Older driver involvements in police reported crashes and fatal crashes: Trends and projections. *Injury Prevention*, 8(2), 116-120.
- Marottoli, R. A., de Leon, C. F. M., Glass, T. A., Williams, C. S., Cooney, L. M., Jr., & Berkman, L. F. (2000). Consequences of driving cessation: Decreased out-of-home activity levels. *Journals of Gerontology: Series B: Psychological Science & Social Science*, 55(6), S334-340.
- Marottoli, R. A., & Richardson, E. D. (1998). Confidence in, and self-rating of, driving ability among older drivers. *Accident Analysis & Prevention*, 30(3), 331-336.
- McAuley, E., Jerome, G. J., Elavsky, S., Marquez, D. X., & Ramsey, S. N. (2003). Predicting long-term maintenance of physical activity in older adults. *Preventive Medicine*, 37(2), 110-118.
- McGwin, G., Sims, R. V., Pulley, L., & Roseman, J. M. (2000). Relations among chronic medical conditions, medications, and automobile crashes in the elderly: A population-based case-control study. *American Journal of Epidemiology*, 152(5), 424-431.
- Metlay, J., Cohen, A., Polsky, D., Kimmel, S. E., Koppel, R., & Hennessy, S. (2005). Medication safety in older adults: Home-based practice patterns. *Journal of the American Geriatrics Society*, 53(6), 976-982.
- Monterde i Bort, H. (2004). Factorial structure of recklessness: To what extent are older drivers different? *Journal of Safety Research*, 35(3), 329-335.

- Movig, K. L. L., Mathijssen, M. P. M., Nagel, P. H. A., van Egmond, T., de Gier, J. J., Leufkens, H. G. M., et al. (2004). Psychoactive substance use and the risk of motor vehicle accidents. *Accident Analysis & Prevention*, 36, 631-636.
- Owsley, C., Ball, K., McGwin Jr, G., Sloane, M. E., Roenker, D. L., White, M. F., et al. (1998). Visual processing impairment and risk of motor vehicle crash among older adults. *Journal of the American Medical Association*, 279(14), 1083-1088.
- Owsley, C., McGwin, G., Sloane, M., Wells, J., Stalvey, B. T., & Gauthreaux, S. (2002). Impact of cataract surgery on motor vehicle crash involvement by older adults. *Journal of the American Medical Association*, 288(7), 841-849.
- Owsley, C., Stalvey, B. T., Wells, J., Sloane, M. E., & McGwin, G. (2001). Visual risk factors for crash involvement in older drivers with cataract. *Archives of Ophthalmology*, 119(6), 881-887.
- Persson, L., Berglund, K., & Sahlberg, D. (1996). A structure of self-conceptions and illness conceptions in rheumatoid arthritis (RA). *Journal of Psychosomatic Research*, 40(5), 535-549.
- Powell, L. E., & Myers, A. M. (1995). The Activities-specific Balance Confidence (ABC) Scale. *Journals of Gerontology. Medical Sciences*, 50A(1), M28-34.
- Roge, J., Pebayle, T., Lambilliotte, E., Spitzenstetter, F., Giselbrecht, D., & Muzet, A. (2004). Influence of age, speed and duration of monotonous driving task in traffic on the driver's useful visual field. *Vision Research*, 44(23), 2737-2744.
- Rudman, D. L., Friedland, J., Chipman, M., & Sciortino, P. (2006). Holding on and letting go: The perspectives of pre-seniors and seniors on driving self-regulation in later life. *Canadian Journal on Aging-Revue Canadienne Du Vieillissement*, 25(1), 65-76.
- Sagberg, F. (2006). Driver health and crash involvement: A case-control study. *Accident Analysis and Prevention*, 38(1), 28-34.
- Scilley, K., Jackson, G. R., Cideciyan, A. V., Maguire, M. G., Jacobson, S. G., & Owsley, C. (2002). Early age-related maculopathy and self-reported visual difficulty in daily life. *Ophthalmology*, 109(7), 1235-1242.
- Tay, R. (2006). Ageing drivers: Storm in a teacup? *Accident Analysis and Prevention*, 38(1), 112-121.
- Uzzell, D., & Muckle, R. (2005). Simulating traffic engineering solutions to predict changes in driving behaviour. *Transportation Research Part F-Traffic Psychology and Behaviour*, 8(4-5), 311-329.
- Verster, J. C., Veldhuijzen, D. S., & Volkerts, E. R. (2006). Effects of an opioid (Oxycodone/Paracetamol) and an NSAID (Bromfenac) on driving ability, memory functioning, psychomotor performance, pupil size, and mood. *Clinical Journal of Pain*, 22(5), 499-504.

- Verster, J. C., & Volkerts, E. R. (2004). Effects of zolpidem and temazepam on driving ability. *Sleep Medicine*, 5(6), 609-610.
- Walker, J. G., Anstey, K. J., & Lord, S. R. (2006). Psychological distress and visual functioning in relation to vision-related disability in older individuals with cataract. *British Journal of Health Psychology*, 11(2), 303-317.
- Wang, C. C., & Carr, D. (2004). Older driver safety: A report from the Older Drivers Project. *Journal of the American Geriatrics Society*, 52, 143-149.
- Wardle, J., Parmenter, K., & Waller, J. (2000). Nutrition knowledge and food intake. *Appetite*, 34, 269-275.
- Wood, J. M. (2002). Age and visual impairment decrease driving performance as measured on a closed-road circuit. *Human Factors*, 44(3), 482-494.
- Yasuda, N., Mino, Y., Koda, S., & Ohara, H. (2002). The differential influence of distinct clusters of psychiatric symptoms, as assessed by the general health questionnaire, on cause of death in older persons living in a rural community of Japan. *Journal of the American Geriatrics Society*, 50(2), 313-320.
- Yee, W. Y., Cameron, P. A., & Bailey, M. J. (2006). Road traffic injuries in the elderly. *Emergency Medicine Journal*, 23(1), 42-46.

7 Appendix: Questions to guide focus group discussions

Awareness component

- Have issues related to driver safety become more important to you over the past few years?
- Are there any aspects of your life that have made you think about changing your driving behaviour?

Information sources

- Have you ever sought out information concerning driver safety?
- What sort of specific information have you looked for?
- What sort of places should be able to provide this information?
- How well do these places provide the information?

On-road anxiety

- Are there any aspects of driving that make you nervous or worried?
- How long have these things been an issue for you?
- Is there anything that you or someone else could do to reduce your concerns about these issues?

Anxiety related to cessation

- What would be the impact on you if you were to substantially cut back on your driving?
- What would be the impact on you if you were to "hang up the car keys" altogether?
- How much would these issues affect your friends and family?
- How much do you think about issues related to giving up driving?