Survey of older licence holders: Are they still driving ? What is the association between mileage driven and crash risk ?

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ABSTRACT

Older drivers have higher per-distance crash rates than most other driver age groups. This has been used to justify a range of road safety countermeasures, including licensing policies requiring demonstration of fitness to drive. In Victoria, where there is no age-based mandatory re-testing, older drivers have less crash involvement on a per licence basis than older drivers in other States. As they are issued with 10 year licences, in 2004 VicRoads commissioned a survey of 2,000 drivers aged 65 years or older to determine how many were still driving. Another primary purpose of the survey was to assess whether older drivers' apparent high crash risk was spread fairly evenly across all drivers in this age group. As part of this task, a number of different ways of calculating crash involvement were explored. Analyses of the survey data showed that older drivers did not comprise a homogeneous group in relation to crash risk. The lower the mileages driven, the higher the crash risk, such that older drivers travelling 20 km or less per week had around ten times the per-distance crash rate of drivers travelling 200 km or more per week. This paper describes the association between mileage driven and crash risk, and discusses the implications for the development of road safety countermeasures.

1 INTRODUCTION

There is no uniform approach to the continued licensing of older drivers in Australasia. New South Wales, Tasmania, Western Australia, South Australia (and New Zealand at the time of this study) have relatively stringent assessment requirements, which entail both medical examinations and on-road assessment for specified age groups. Queensland also requires medical examinations every five years. The Northern Territory requires vision examinations. In contrast, Victoria has no regular testing, whether medical or on-road[1].

Victoria's policy is based on the functional ability to drive, such that Victorians can drive to any age as long as they are safe to do so. The system operates on community referrals of at-risk drivers to the licensing authority, VicRoads. Most referrals are made by Police, with the remainder from health professionals, concerned family members and friends, and other members of the public.

[1] In addition to whatever mandatory requirements may exist, any driver of any age in any jurisdiction can be required to demonstrate fitness to continue driving through a variety of assessment means.

In April 2003 Victoria's Parliamentary Road Safety Committee conducted an Inquiry into Road Safety for Older Road Users. The Committee was presented with a series of analyses that compared Victorian older drivers' crash involvement with that of drivers from other Australian jurisdictions.

A limited number of studies have compared older driver crash rates under different licensing systems across the Australian jurisdictions (Torpey, 1986; Langford, Fitzharris, Newstead and Koppel, 2004; and Langford, Fitzharris, Koppel and Newstead, 2004). The common conclusion has been that the safety performance of Victorian older drivers compares favourably and that the mandatory licence re-testing schemes used in other jurisdictions have no demonstrable road safety benefits.

However, these studies have only partly allowed for possible differences in driving circumstances across the jurisdictions. For example, older Victorians are more likely to be licensed relative to older people in New South Wales (Langford et al, 2004). Some older people may maintain their driving licences but rarely if ever drive. If so, the proportion of inactive licence holders might be higher in Victoria than in New South Wales, where arguably, it is more likely that inactive drivers would either surrender or lose their licences at the time of mandatory assessment.

VicRoads has long recognised that existing jurisdictional comparisons based on per-driver crash rates might be invalid because of possible differences in the proportions of active drivers across the jurisdictions. Along similar lines, the Victorian Parliamentary Road Safety Committee in its Inquiry into Road Safety for Older Road Users noted that "it is unwise to compare Victoria with other jurisdictions until the true extent of driving by older Victorian licence holders can be determined …" (2003, p34). The Committee recommended that VicRoads undertake research to improve the reliability of crash information by determining the number of licence holders who are actually driving.

2 AIMS

There were two main aims to the study:

- to determine how many Victorian drivers aged 65 years and over were still driving; and
- to examine whether older drivers' apparent high crash risk was spread fairly evenly across all drivers in this age group.

3 METHOD

In 2004 VicRoads commissioned the Monash University Accident Research Centre (MUARC) to design a telephone survey questionnaire to determine the proportion of licence holders aged 65 years and above who were active drivers. The survey was conducted in June 2004 by Research International and consisted of telephone interviews of 2,000 older Victorian licence holders. Respondents were selected from an initial sample of 16,000 identified from VicRoads' licensing database.

Table 1 shows details of the final sample of 2,000 respondents, analysed by age and gender, and as a proportion of the initial list of possible participants provided by VicRoads randomly selected from its licensing database

TABLE 1: Survey sample details, (VicRoads Older Driver Survey 2004)

	Total	Gender		Age		
		Male	Female	65-69	70-74	75+
Initial list provided by VicRoads	16,000	9,107	6,893	5,128	4,161	6,711
Survey sample – no.	2,000	1,056	944	606	581	813
Survey sample – % of initial list	12.5	11.6	13.7	11.8	14.0	12.1

The makeup of the final sample of 2,000 respondents in the survey was slightly biased towards females and towards respondents aged 70-74 years and was restricted to licence holders who had been matched to telephone numbers. As comparable data for all older Victorians holding a driver licence were not available, it is not possible to determine how representative the survey sample was of all older licence holders.

4 RESULTS AND DISCUSSION

4.1 DRIVING STATUS AT THE TIME OF THE SURVEY

Table 2 shows the driving status of respondents, analysed by gender and age.

TABLE 2: Respondents' driving status, by gender and age (VicRoads Older Driver Survey 2004)

Driving status	No. and proportion either still driving or ceased driving	Male		Female	
	Age	No.	%	No.	%
Currently driving	65-69	310	99.4	285	97.9
	70-74	300	98.7	267	96.7
	75+	409	94.7	326	88.4
	Sub-total currently driving	1019	97.2	878	93.8
Ceased driving	65-69	2	0.6	6	2.1
	70-74	4	1.3	9	3.3
	75+	23	5.3	43	11.6
	Sub-total ceased driving	29	2.8	58	6.2
Total		1048100.0		936	100.0

NOTE: 16 of the initial 2000 respondents did not have a current licence and were excluded from the survey.

Of the 1984 male and female respondents holding a current driver's licence, 96% (n=1897) reported that they were active drivers, with 4% (n=87) reporting that they had ceased to drive. The extent of active driving varied across gender, such that males were more likely to be still driving (97.2% compared to 93.8% for females). This difference was statistically significant (Odds Ratio = 2.32, 95%CI: 1.44-3.75).

Driving status was also found to be associated with age. Drivers from the youngest age group were also more likely to be still driving, especially when compared with the oldest age group (98.7% of licence holders aged 65-69 years were still driving, compared to 91.8% of those 75 years or older). This difference was statistically significant (Odds Ratio = 6.68, 95%CI: 3.07-15.15).

When age and gender were jointly considered, age effects on driving status were much greater for females than for males. Female licence holders aged 75 years and older were less likely to be active drivers than all other groups. Active driving levels ranged from 99.4% for males aged 65-69 years to 88.4% for female licence holders 75 years or older.

DISCUSSION:

Ninety six percent of surveyed licence holders reported that they were still active drivers. This statistic largely allays the concern that in Victoria older people may be more likely to maintain their driving licences but rarely if ever drive.

However the 96% level of active drivers pertains only to those respondents who agreed to participate in survey. Looking at the larger group of licence holders for whom recruitment was attempted, it was found that some drivers on the licensing data base had died and others declined to participate in the survey because they had ceased driving. Taking these factors into account, it has been estimated that the proportion of active drivers was somewhat less at 92.5%. While equivalent data for other jurisdictions are not available, it is unlikely that even this reduced level of active drivers would have a substantial impact upon possible inter-jurisdictional comparisons, especially as over one-half of the increase in inactive drivers was attributable to those who had died since their last licence renewal.

These findings do not guarantee the validity of any inter-jurisdictional crash comparisons based on per-driver crash rates. Firstly, most jurisdictional comparisons involving older drivers target the oldest age groups rather than the age range used in the survey (65 years and older). The survey data showed that for both genders (and especially females), the older the age group, the greater the proportion of licence holders who have ceased driving. While it is likely that an equivalent trend exists for other jurisdictions, neither the trend nor its size has been confirmed.

Secondly, per-driver crash comparisons will always have limitations. Using driver numbers as the basis of comparison is valid only if several conditions hold true. Apart from the need to assume similar levels of active drivers, it also needs to be assumed that at the very least, drivers are active to the same extent and drive under the same conditions (in particular, along the same parts of the road network and for the same distances). These assumed similarities are rarely tested and commonly exist as major qualifiers to any interpretation of per-driver crash comparisons.

4.2 OLDER LICENCE HOLDERS' DRIVING AND CRASH PATTERNS

Respondents who were still active drivers were asked how many kilometres they had driven in the last week.

TABLE 3: Respondents' driving distance, by gender (VicRoads Older Driver Survey 2004)

Weekly distance driven	Male		Female		Total	
	No.	%	No.	%	No.	%
50 km or less	288	28.7	456	57.4	744	41.4
51-100 km	175	17.4	154	19.4	329	18.3
101-200 km	231	23.0	95	11.9	326	18.1
200 km or more	309	30.8	90	11.3	399	22.2
Total	1003	100.0	795	100.0	1798	100.0

NOTE: Distance data were unavailable for 99 active drivers

The weekly distances driven were often moderate, with 41.4% driving less than 50 kilometres per week. Males drove longer weekly distances (53.8% drove over 100 kilometres per week, compared to 23.2% of females). The differences were statistically significant: (Odds Ratio = 3.85, 95%CI: 3.11-4.75).

Table 4 shows weekly distance driven, analysed by age.

TABLE 4: Respondents' driving distance, by age (VicRoads Older Driver Survey 2004)

Weekly distance driven	65-69 years		70-74 years		75+ years		Total	
	No.	%	No.	%	No.	%	No.	%
50 km or less	188	32.7	207	38.7	349	50.7	744	41.4
51-100 km	121	21.0	90	16.8	118	17.2	329	18.3
101-200 km	109	19.0	102	19.1	115	16.7	326	18.1
200 km or more	157	27.3	136	25.4	106	15.4	399	22.2
Total	575	100.0	535	100.0	688	100.0	1798	100.0

NOTE: Distance data were unavailable for 99 active drivers

Drivers from the oldest age group were most likely to be driving less than 50 kilometres per week (50.7% compared to 32.7%). The differences were statistically significant: (Odds Ratio = 2.12, 95%CI: 1.67-2.68).

Respondents were asked whether they had had an accident (of any severity) in the last two years. Table 5 shows the crash rates for all licence holders and for active drivers only, analysed by gender.

TABLE 5: Respondents' crash involvement, by gender (VicRoads Older Driver Survey 2004)

	Male	Female	Total
No. crashes in last 2 yrs	64	45	109
No. licence holders	1048	936	1984
No. active drivers	1019	878	1897
% of licence holders in crashes (annual)	3.1	2.4	2.7
% of active drivers in crashes (annual)	3.1	2.6	2.9

For the total sample, 109 of the 1897 active drivers reported that they had been involved in a crash in the last two years – meaning on average, 2.9% were in crashes annually[2].

This overall rate varied across gender, such that males were more likely to have been in crashes: Just over 3% of active male drivers were in crashes each year, compared to 2.6% of females. However the small numbers at this level of analysis meant that the difference was not significant.

(There was no consistent evidence of an association between age and crash involvement.)

DISCUSSION:

The composite picture emerging in terms of amount of driving activity, is that many older drivers (and especially males) drive only moderate distances (50.7% of the oldest drivers drove 50 kilometres or less per week, compared to 32.7% of the youngest drivers). As age increases, the distances driven decline. The extent to which these trends will continue with the next cohorts of older drivers may well change, with one plausible outcome being that the frequency and amount of driving will increase particularly but not only for females (Hu, Jones, Reuscher, Schmoyer & Truett (2000).

[2] There is no direct way of validating the self-reported crash data. However a recent sample of almost 1,000 New Zealand older drivers aged 80 years and above reported a 5.9% annual crash involvement. The oldest drivers in the Victorian survey - 75 years and above – showed an almost identical crash involvement of 5.6%.

A comparison of per-driver crash rates across gender and across the three age groups suggested that there was a modest gender-related variation in regard to the proportions involved in crashes each year. This issue is explored in more detail in the next section.

4.3 CALCULATING OLDER DRIVERS' CRASH PROPENSITY

Older Driver Crash Rates per 10,000 Drivers

The survey data have been used to construct crash rates based on the three denominators: per 10,000 active drivers; per 10m driver-kilometres; and per 10m driver-kilometres separately for different weekly distances driven. The crash rates presented throughout this section relate to self-reported crashes of any severity, including non-casualty.

Table 6 shows the crash rates per 10,000 drivers, analysed by gender.

TABLE 6: Respondents' crash rates per 10,000 drivers, by gender (VicRoads Older Driver Survey 2004)

	Male	Female	Total
No. of crashes in last 2 yrs	64	45	109
No. of drivers	1048	936	1984
Annual crash rate per 10,000 drivers	314.0	256.3	287.3

The crash rate varied across gender, with males more likely to have been in crashes. Males had an annual crash rate of 314 per 10,000 active drivers compared to 256.3 for females – meaning that they were 1.2 times more likely to be in crashes.

(There was no consistent evidence of an age-related increase in annual crash rates: the crash rate for drivers 65-69 years was 235.3, for drivers aged 70-74, 352.7, and for drivers 75-plus years was 278.9.)

Older Driver Crash Rates per 10m Driver-Kilometres

Table 7 shows the annual crash rates per 10 million driver kilometres, analysed by gender.

TABLE 7: Respondents' crash rates per 10 million driver-kilometres, by gender (VicRoads Older Driver Survey 2004)

	Male	Female	Total
No. crashes in last 2 yrs	64	43	107
No. active drivers	1003	795	1798
Annual no. of driver-kilometres (million)	9.29	3.81	13.09
Annual crash rate per 10m driver-kilometres	34	56	40

There was an association between annual crash rates per 10 million driver-kilometres and gender, such that females had a crash rate roughly 1.5 times higher than that of males.

(When analysed by age, the youngest driver group had substantially fewer crashes than the two older groups, who had very similar crash rates.)

Older Driver Crash Rates per 10m Driver-Kilometres Separately for Different Weekly Distances Driven

Figure 1 compares the male and female annual crash rates per 10 million driver kilometres for the four distance groups. Figure 2 compares the different age groups' annual crash rates per 10 million driver kilometres for each distance group.

Figure 1 shows that for respondents overall, the different distance groups have different crash rates. Older drivers covering 50 kilometres or less per week had a crash rate 1.8 times greater than the next distance group (those driving 51-100 kilometres per week), 4.4 times greater than the next group (101-200 kilometres) and 10 times greater than the longest distance group (more than 200 kilometres).

This pattern broadly held for both male and female drivers and for all three age groups. That is, the annual crash rates were substantially higher for those drivers covering short distances per week, relative to drivers covering longer distances. Once different distances were taken into account, female drivers mainly had lower crash rates than male drivers – the one exception to this being females who drive 51-100 kilometres per week. There was no consistent age-related pattern, although the youngest drivers generally had the lowest crash rates.

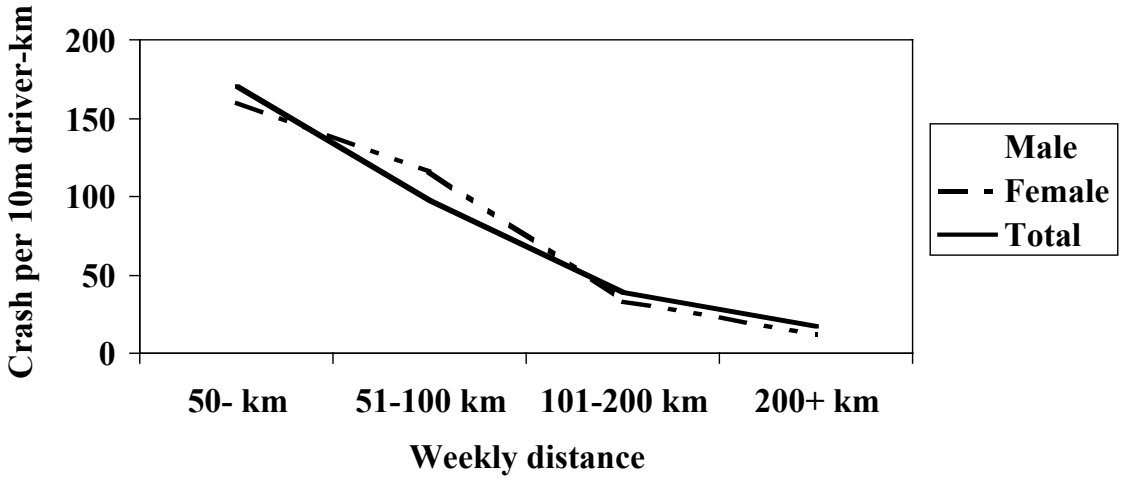

FIGURE 1: Respondents' crash rates per 10 million driver-kilometres for separate distance groups, By gender (VicRoads Older Driver Survey 2004).

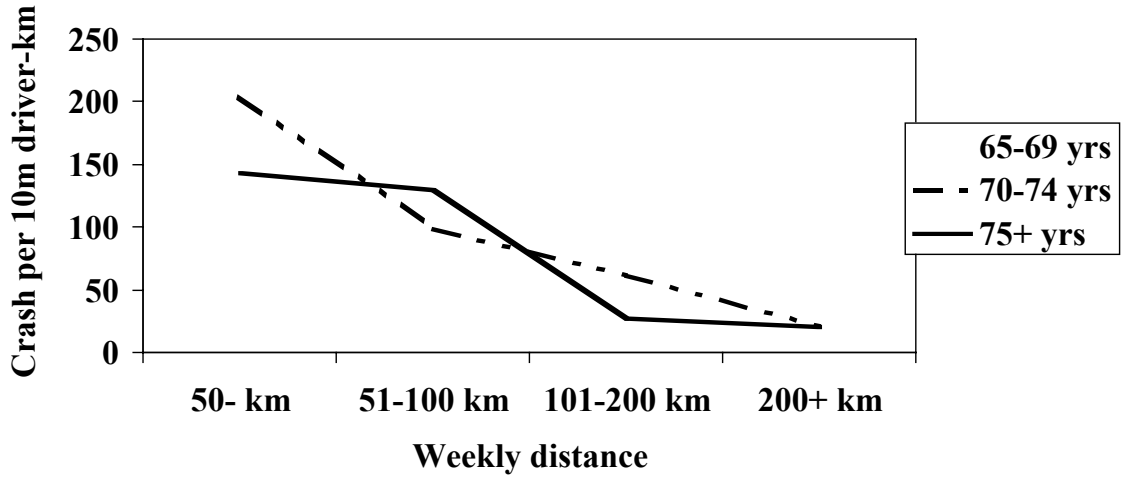

FIGURE 2: Respondents' crash rates per 10 million driver-kilometres for separate distance groups, by age (VicRoads Older Driver Survey 2004).

In looking at the association between weekly mileage and crash involvement one major qualification needs to be made in regard to Figures 1 and 2. It remains to be determined whether older drivers' weekly mileage, reported at the time of the survey, was the same as that driven at the time their crashes occurred.

DISCUSSION:

The associations between crash involvement and gender derived from the survey data vary across the three different crash denominators:

- When crash rates per 10,000 drivers were considered, males had a 1.2 additional crash involvement (see Table 9);
- Males were more than twice as likely to be driving 100 kilometres or more per week, relative to females (see Table 5);
- Once different driving exposure was controlled by using crash rates per 10 million driver-kilometres, there was a reversal of the previous finding: females had a crash rate roughly 1.5 times higher than that of males (see Table 11);
- Drivers travelling more kilometres will typically have reduced crash rates per kilometre, compared to those driving fewer kilometres (Janke, 1991). This finding, together with Janke's 'low-mileage bias', requires that gender comparisons of crash rates per 10 million driver–kilometres be made only for males and females within the same distance groups;
- Once crash rates per 10 million driver–kilometres were calculated separately for the different distance groups (see Figure 1), females had lower crash rates than males for three of the four distance groups.

Depending on which of the denominators were used, females were variously safer, less safe or (mainly) safer than males.

The selection of appropriate denominators is particularly critical when comparing the crash rates of different age groups. The traditional U-shaped curve most commonly used to

denote older drivers' apparently high crash risk by comparing crash rates across all driver ages, is based on crashes per number of driver-kilometres for each age group. This approach fails to take into account the finding that the oldest (and youngest) drivers generally drive shorter distances than other age groups – thus leading to an exaggerated view of both younger and older drivers' crash involvement when the per-distance crash rates of different age groups are compared (Janke, 1991).

Selecting the denominator for crash rates will always depend upon a number of considerations, not the least being the availability of the required measures. However it is argued that crash rates per 10 million driver–kilometres compared separately for different distance groups (rather than overall per-driver or per-distance rates), represent the most robust measure of crash risk. It also needs to be recognised that as is the case for any exposure measure, this recommended approach does not control for all relevant factors. Use of crash rates per 10 million driver–kilometres compared separately for the different distance groups, also requires that a range of additional factors be recognised in both the research design and interpretation of results.

5. CONCLUSIONS

5.1 MAIN FINDINGS

This survey was prompted primarily by the concern that in Victoria, more older people may maintain their driving licences but rarely if ever drive, relative to other jurisdictions. Possible differences in the proportions of active drivers across jurisdictions might therefore invalidate the existing analyses of per-driver crash rates, which have commonly shown Victorian older drivers to be at least as safe as drivers elsewhere in Australia.

Respondents from a sample of 2,000 Victorian older licence holders were asked whether they were active drivers at the time of the survey. While most (95.6%) were still driving, the proportion of active drivers varied with both age and gender: For example, 99.4% of male licence holders aged 65-69 years were still driving but only 88.4% of female drivers aged 75 years or older were active drivers. Further, the proportion of active drivers was not as high for the larger group of licence holders for whom recruitment to the survey was attempted. In this instance it was estimated that the proportion of active drivers was 92.5%.

Despite these variations in driving status, it was considered unlikely that jurisdictional per-driver crash comparisons would be substantially affected. At the same time, it was pointed out that per-driver crash rates were based upon a number of other untested assumptions which limited the value of any conclusions drawn from them.

The limitations of per-driver crash rates were illustrated by using the survey data to compare male and female drivers' crash rates using three denominators: per 10,000 drivers, per 10m driver-kilometres and per 10m driver-kilometres separately for different distances driven. Depending upon which of the denominators were used, females were variously safer, less safe or (mainly) safer than males. It has been argued that crash rates per 10 million driver–kilometres compared separately for different distance groups (rather than overall per-driver or per-distance rates), represent the most robust measure of crash risk available from the survey data.

Another major finding emerging from the survey data was confirmation of the so-called 'low-mileage bias': that is, drivers travelling more kilometres had reduced crash rates per kilometre, compared to those driving fewer kilometres. For example, for the overall

sample, older drivers covering 50 kilometres or less per week had a crash rate 1.8 times greater than next distance group (those driving 51-100 kilometres per week), 4.4 times greater than the next group (101-200 kilometres) and 10 times greater than the longest distance group (more than 200 kilometres).

The conclusion drawn from this finding was that the traditional U-shaped curve most commonly used to denote older drivers' apparently high crash risk, has led to an exaggerated view of older drivers' crash involvement. This is because of its failure to account for the different crash rates of different driver distance groups. Countermeasures should target shorter distance older drivers due to their higher crash rate. It would first be necessary to determine the reason for the higher crash rate, for example, more use of the urban road network. In this case the most effective countermeasure would be to address the infrastructure. If the higher crash rate is due to a reduced fitness to drive, then targeted assessment would be the most effective countermeasure.

5.2 SUGGESTIONS FOR FURTHER RESEARCH

Because the survey was restricted to respondents aged 65 years or older, it was not possible to make any conclusions about older drivers' crash involvement relative to other age groups. However the high crash involvement rate of short distance older drivers suggests that this group would be a logical target for any road safety interventions. If so, it is suggested that further research into this specific sub-group be undertaken.

In particular it is recommended that the survey data, supplemented by further research, be analysed to investigate the following issues. Why are short distance older drivers at heightened risk? Is it because of their greater use of the urban road network and/or because of reduced fitness to drive? Are there other confounders responsible for the apparently strong association between distance driven and heightened crash involvement (particularly, a possible age/gender interaction)? A more complete understanding of the 'low-mileage bias' as it affects older drivers, is critical to the design and implementation of appropriate road safety countermeasures.

REFERENCES

Hu P, Jones D, Reuscher T, Schmoyer R & Truett T (2000). *Projecting fatalities in crashes involving older drivers* Report for the National Highway Traffic Safety Administration, Oak Ridge National Laboratory Tennessee: ONRL

Janke M (1991). Accidents, mileage and the exaggeration of risk. *Accident Analysis and Prevention,* 23(2-3), 183-188.

Langford J, Fitzharris M, Newstead S, Koppel S (2004). Some consequences of different older driver licensing procedures in Australia, *Accident Analysis & Prevention,* 36, 18993-1001.

Langford J, Fitzharris M, Newstead S, Koppel S (2004). Effectiveness of mandatory license testing for older drivers in reducing crash risk among urban older Australian drivers, *Traffic Injury Prevention*, 5(4), 326-335.

Torpey SE (1986). Licence re-testing of older drivers, Road Traffic Authority, Melbourne, Australia.