Older adults and driving reduction: is the gender gap narrowing?

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Abstract

This study investigated driving reduction in a diverse sample of 229 male and female older drivers aged 70 years and above in Queensland, Australia. The study sought to determine whether differences existed between male and female older drivers in regard to driving patterns, and to identify factors that were predictive of driving reduction in female versus male older drivers. Participants provided information on their health, self-reported driving patterns, driving perceptions, alternative transport options, and feedback. Overall, females were more likely to avoid challenging situations but less likely to reduce their driving when compared to males. Self-rated health and driving confidence were significant predictors for driving reduction among females. For males, driving importance was the only significant predictor for driving reduction in this sample. This study indicates the need for longitudinal research on the process of driving reduction and whether the planning process for driving cessation differ between females and males.

Introduction

Older women drivers are over-represented in serious injury and fatality crashes compared to older men due to their increased fragility (Oxley, Charlton, Scully, & Koppel, 2010). The future cohort of older women will rely more on their private cars and may be more reluctant to give up driving compared to current and past generations (Rosenbloom & Herbel, 2009). If women choose to drive when they are no longer safe to do so, they may be putting themselves and others at risk (Rosenbloom & Herbel, 2009). On the other hand, older women have a higher disability rate than men of similar age (Alsnih & Hensher, 2003) and may require more assistance to maintain their mobility needs. With the increasing number of older women living alone (Siren, Hakamies-Blomqvist, & Lindeman, 2004), it is expected that cessation of driving among this age group will have drastic consequences (Siren et al., 2004).

Older women are more likely to stop driving before older men (Kostyniuk & Molnar, 2008). This is partly due to how women view the role and the importance of driving. For women, driving is an essential mean to meet their daily practical needs (e.g. family commitments) while for men it is key to their identity and freedom (Musselwhite & Haddad, 2010b). In addition, older women may lack confidence in their driving as they often have less driving experience when compared to men (Marottoli et al., 1993). As women are starting to resemble men in terms of education and employment, their driving experience and their attitude towards driving may start to resemble that of men (Rosenbloom, 2006). Driving will become an integral part of their identity, and similar to men, it will be the key to their freedom and independence (Rosenbloom & Herbel, 2009).

Self-regulation can be regarded as a mechanism for coping with the declines in driving ability some older drivers may experience (Choi, Adams, & Mezuk, 2012) in an attempt to maintain their driving privilege (Charlton et al., 2006). Driving reduction is one of the most common self-regulatory behaviour adopted by ageing drivers (Molnar et al., 2013; Raitanen, Törmäkangas, Mollenkopf, &

Marcellini, 2003). It is still however unclear if the factors that predict driving reduction among older drivers differ by gender.

This cross-sectional study investigated self-reported driving behaviours and self-reported driving reduction among a sample of older drivers in Queensland, Australia, with the aims of (a) identifying the psychosocial and environmental predictors of the decision to reduce driving and (b) if these predictors differed between males and female.

Methodology

Participants (N=229 after elimination of 18 with key information missing) were recruited through various strategies such as flyers posted and distributed in seniors' clubs, geriatric clinics, and local shopping centres, advertisements in local newspapers and through social media. Eligible participants were current drivers aged 70 years and older. Participants completed the questionnaire online or in a paper-based form with a paid return envelope to the principal researcher. Both questionnaires included an information sheet describing the nature of the study and completing the questionnaire was considered evidence for consent to participate. All participants received the chance to enter a draw to win one of ten $50 shopping vouchers. All procedures were approved by the Human Research Ethics Committee of Queensland University of Technology. Table 1 (which is described in more detail below) provides an overview of the sample.

Materials

Outcome variables

Self-reported driving reduction: rating of overall amount of driving compared to ten years ago on a 4 point scale from "much less" to "more" (grouped into two categories: "much less, a little less" vs "the same, more").

Self-reported driving frequency: annual kilometres driven - "less than 5,000 km/year", "5,001-10,000 km/year", "10,001-20,000 km/year", 20,001-30,000 km/year" and "more than 30,001 km/year" (collapsed into "less than 5,000 km/year", "5,001-10,000 km/year" and "more than 10,001 km/year").

Independent variables

A total of 15 independent variables were included in the regression analysis. Several variables were collapsed into two or three alternatives in order to obtain meaningful categories with respect to the purposes of the study.

Socio-demographic variables: age (years), living condition (alone or with spouse), principal driver (yes or no), self-rated health ("very poor", "poor", "fair", "very good", and "excellent"), driving experience (length of possession of an open driving license); feedback about driving from doctor or family members (discussion about driving in the past year); life goal decisions (moving to an aged-care facility, moving closer to public transport, or moving closer to common destinations).

Psychosocial variables: importance of driving ("extremely important", "very important", "moderately important", "somewhat important", "not that important"); perceived driving ability scale (PDA), a previously validated 15-item scale (MacDonald, Myers, & Blanchard, 2008) measuring participants' current perceived driving abilities (''poor'', ''fair'', ''good'', ''very

good"); driving stress scale measuring experienced stress in a number of driving situations (four points from "heavy stress" to "no stress") with a mean "Driving Stress" score (Hakamies-Blomqvist, 1994a); driving confidence for 10 driving conditions (10 points from "not at all confident" to "completely confident" with a total mean score (Marottoli & Richardson, 1998); a driving relinquishment scale developed to assess participants' views about the importance of driving and barriers toward giving up driving using agreement with eight statements and taking a mean scale score. Psychometric properties of all scales used in this study are shown in Table 2, together with means and standard deviations.

Analysis

Data were analysed in SPSS version 20.0 (IBM Corporation, Armonk, NY). Differences between those who reduced and those who did not reduce driving on each of the 15 independent variables were examined using Chi-square analysis and t-test statistics. Then differences between amounts of driving measured by the annual km driven on each of the 15 independent variables were examined. A preliminary regression analysis confirmed that gender was a significant predictor for self-reported driving reduction. After this, the sample was divided into males and females, and further analyses were conducted. Binary logistic regression modelling was used to determine the characteristics of those who reduced their driving compared to those who did not for both males and females. A hierarchical regression model was developed, where the effect of age and driving experience was controlled for. The analysis therefore focused on the effect of modifiable psychosocial and environmental factors. Intercorrelations between predictor variables showed no excessive multicollinearity. Relevant independent variables were included in the analysis with a p-value cut-off point of 0.25. Stepwise logistic regression was conducted and variables were retained in the model at a $p < 0.05$.

Results

Sample characteristics and significant gender differences

The sample ranged in age from 70 to 94 years (M= 75.6, SD ± 5.2), and included 92 females (40.2 %) and 137 males (59.8%) (Table 1). Around 60.7% of the participants reported living with a spouse or partner and significantly more women were living alone compared to men (51.1% vs. 21.9%, ($\chi 2$ (2) = 24.487, p <0.001)). Men had significantly more driving experience compared to women (t (227) =-4.08243, p<0.001)

The number of annual kilometres driven was significantly different by gender ($\chi 2$ (2) = 7.135, p <0.05). For men, participants who reported driving less than 5,000 km/year also reported greater reliance on their family compared to those who drove 5,000-10,000km/year and more than 10,001 km/year (70.8% vs. 45.6% vs. 33.9% ($\chi 2$ (2) = 9.241, p <0.01). In addition, those who reported driving more than 10,001 km/year reported driving to be extremely important compared to the other two groups (50% vs. 35.1% vs. 20.8% ($\chi 2$ (4) = 13.589, p <0.009). Participants who reported using in-vehicle technology were more likely to report driving more than 10,001 km/year than those who did not use it (54.5% vs. 16.3%, ($\chi 2$ (2) = 22.847, p <0.001). Doctor's feedback about driving was also significantly associated with driving less kilometres per year ($\chi 2$ (2) = 7.386, p <0.025). Annual kilometres driven groups were also significantly associated with age (Welch's F (2, 56.296) = 9.010, p <0.001), PDA scale scores (F (2, 134) = 4.522, p < 0.01), stress scale scores (F (2, 134) = 4.915, p < 0.009), and confidence scale scores (Welch's F (2, 57.686) = 6.448, p <0.01). For women, annual kilometres driven groups were significantly associated with stress scale scores (F (2, 89) = 4.862, p < 0.01), driving relinquishment scale score (F (2, 89) = 4.135, p < 0.01), and confidence scale scores (F (2, 89) = 4.150, p <0.01).

The majority of participants (69.9%) indicated that they have reduced their overall driving compared to ten years ago. However, males were significantly more likely to reduce their driving compared to females ($\chi 2$ (1) = 10.980, p <0.05). The most avoided driving situations were driving at peak hour (35.5%), and night driving (31.6%), however there were no significant differences between males and females for these situations. Females reported greater avoidance compared to males of driving long distance (43.5% vs. 21.3%), in the rain (31.5% vs. 17.6%), on freeways (24.2% vs. 11.9%), as well as parallel parking (21.7% vs. 9.6%) and lane changing (12% vs. 3.7%). Females also scored higher on the avoidance scale (which indicates greater avoidance behaviour) (t (168.510) = 3.419, p <0.001).

There were no significant differences between males and females in terms of rating on the PDA scale and the driving relinquishment scale. However, females were significantly more likely to rate driving as extremely important compared to males ($\chi 2$ (2) = 6.561, p <0.038). In addition, females reported higher scores on the stress scale (0.31, t (227) = -4.013, p <0.001) and lower scores on the confidence scale (0.67, t (227) = -2.511, p <0.05).

Driving reduction

An initial analysis examined the association between driving reduction among the whole sample and the independent variables. Driving reduction was significantly associated with gender ($\chi 2$ (1) = 10.980, p <0.001) with more males than females reducing their driving (78.1% vs. 57.6%). Driving reduction was also significantly associated with increasing age (t (227) = -2.543, p <0.012) and with increased driving experience (t (227) = -2.772, p <0.006). Around 82.4% of participants living in retirement homes reduced their driving compared to 66.3% of those living in their private home ($\chi 2$ (1) = 4.857, p <0.028). Participants who rated their health to be very good or fair reported greater driving reduction compared to those who rated their health to be excellent (80.8% vs. 72.1% vs. 48.8% ($\chi 2$ (2) = 11.906, p <0.003)). Participants who rated driving to be extremely important reported less reduction of their driving ($\chi 2$ (2) = 23.402, p <0.001). Participants who had discussed their driving with their doctor reported more reduction compared to those who had not (79.6% vs. 62.6% ($\chi 2$ (1) = 7.693, p <0.006)) and the same with family's feedback (80.4% vs. 62.1% ($\chi 2$ (1) = 8.886, p <0.003). Lower ratings on the PDA scale were also significantly associated with driving reduction (t (227) = 2.339, p <0.05) as well for the diving confidence scale (t (180.961) = 2.851, p <0.005).

Separate analyses were then conducted to examine driving reduction for males and females. For men, driving reduction was significantly associated with self-rated quality of driving ($\chi 2$ (2) = 7.545, p <0.023), driving importance ($\chi 2$ (2) = 16.028, p <0.001), and doctor's feedback ($\chi 2$ (1) = 4.688, p <0.030). For women, driving reduction was significantly associated with self-rated health ($\chi 2$ (2) = 9.310, p <0.01), driving importance ($\chi 2$ (2) = 6.889, p <0.032), moving to a place with better public transport options ($\chi 2$ (1) = 6.366, p <0.012), family's feedback ($\chi 2$ (1) = 5.598, p <0.018), PDA scale (t (90) = 2.032, p <0.045), and confidence scale (t (89.977) = 2.924, p <0.004).

Table 1. Sample characteristics (n=229)

	Overall sample (n=229)	Female (n=92)	Male (n=137)
Mean age in years (SD)	75.6 (5.2)	75.4 (5)	75.7 (5)

Principal driver			
Yes	159 (69.4%)	65 (70.7%)	94 (68.6%)
No	70 (30.6%)	27 (29.3%)	43 (31.4%)
Education			
Primary/Secondary	109 (47.6%)	*54 (58.7%)*	*55 (40.1%)*
school	56 (24.5%)	*18 (19.6%)*	*38 (27.7%)*
Certificate	64 (27.9%)	*20 (21.7%)*	*44 (32.1%)*
University degree			
Dwelling			
A private home	178 (77.7%)	76 (82.6%)	102 (74.5%)
A retirement home or	51 (22.3%)	16 (17.4%)	35 (25.5%)
seniors' complex			
Living condition			
Alone	77 (33.6%)	*47 (51.1%)*	*30 (21.9%)*
With spouse or	139 (60.7%)	*38 (41.3%)*	*101 (73.7%)*
partner	13 (5.7%)	*7 (7.6%)*	*6 (4.4%)*
Other			
Employment			
Yes	68 (29.7%)	30 (32.6%)	38 (27.7%)
No	161 (70.3%)	62 (67.4%)	99 (72.3%)
Driving experience,			
years open driving	55.2 (0.4)	*52.8 (0.7)*	*57 (0.5)*
license (mean and			
standard deviation)			
Annual km driven			
Less than 5,000	53 (23.1%)	*29 (31.5%)*	*24 (17.5%)*
km/year	94 (41%)	*37 (40.2%)*	*57 (41.6%)*
5,000-10,000 km/year	82 (35.8%)	*26 (28.3%)*	*56 (40.9%)*
More than 10,000			
km/year			
Public transport use			
Frequently/Sometimes	81 (35.4%)	32 (34.8%)	49 (35.8%)
Never/Rarely	146 (63.8%)	59 (64.1%)	87 (63.5%)
Family ride			
Frequently/Sometimes	115 (50.2%)	53 (57.6%)	62 (45.3%)
Never/Rarely	114 (49.8%)	39 (42.4%)	75 (54.7%)
Taxi use			
Frequently/Sometimes	19 (8.3%)	11 (12%)	8 (5.8%)
Never/Rarely	210 (91.7%)	81 (88%)	129 (94.2%)
Moving closer to			
common destinations			
Yes	56 (24.5%)	23 (25%)	33 (24.1%)
No	173 (75.5%)	69 (75%)	104 (75.9%)
Moving to an aged-			
care facility	33 (14.4%)	11 (12%)	22 (16.1%)
Yes	196 (85.6%)	81 (88%)	115 (83.9%)
No			
Moving to a place			
with better public			
transport options	49 (21.4%)	*27 (29.3%)*	*22 (16.1%)*
Yes	180 (78.6%)	*65 (70.7%)*	*115 (83.9%)*

No			
In-vehicle technology use (e.g. navigation system, cruise control, blind spot detection)			
Yes	125 (54.6%)	*37 (40.2%)*	*88 (64.2%)*
No	104 (45.4%)	*55 (59.8%)*	*49 (35.8%)*
Driving reduction			
Reduced	160 (69.9%)	*53 (57.6%)*	*107 (78.1%)*
Not reduced	69 (30.1%)	*39 (42.4%)*	*30 (21.9%)*
Self-rated health			
Excellent	41 (17.9%)	23 (25%)	18 (13.1%)
Very good	136 (59.4%)	53 (57.6%)	83 (60.6%)
Fair	52 (22.7%)	16 (17.4%)	36 (26.3%)
Driving importance			
Extremely important	101 (44.1%)	*48 (52.5%)*	*53 (38.7%)*
Very important	100 (43.7%)	*38 (41.3%)*	*62 (45.3%)*
Moderately important/Somewhat important	28 (12.2%)	*6 (6.5%)*	*22 (16.1%)*
Self-rated quality of driving	54 (23.6%)	17 (18.5%)	37 (27%)
Excellent	142 (62%)	62 (67.4%)	80 (58.4%)
Good	33 (14.4%)	13 (14.1%)	20 (14.6%)
Average			

Notes: Italic and bold font indicate significant gender differences measured by Chi-square test and independent-sample t-test, $p<0.05$

Table 2. Descriptions of the psychometric properties of scales

Scale	Number of items	Mean	SD	Scale actual range	Scale sample range	Cronbach's alpha
PDA scale	15	2.3	0.5	0-3 (3 higher ratings)	0-3	0.93
Driving stress scale	16	1.98	0.6	0-3 (3 less stress)	0-3	0.94
Driving relinquishment scale	8	1.3	0.5	0-3 (3 indicates more positive attitude)	0-2.6	0.8
Driving confidence scale	10	7.77	2.0	1-10 (10 indicates more confidence)	1-10	0.96

Predictors of driving reduction
After adjusting for the effect of age and driving experience, self-rated driving importance was the only significant predictor of driving reduction among males (Table 3). For females, self-rated health and driving confidence were the only significant predictors of driving reduction (Table 4).

Table 3. Logistic regression analysis and the best predictor variables for driving reduction among males (n=137)

	B	SE	Odds ratio	*P* value	95% CI of odds ratio
Driving importance (reference extremely important)					
Very important/ Moderately important	1.648	0.460	5.2	0.001	2.1-2.8

χ2= 18.391, *p<0.001,* Nagelkerke R2=0.193

Table 4. Logistic regression analysis and the best predictor variables for driving reduction among females (n=92)

	B	SE	Odds ratio	*P* value	95% CI of odds ratio
Self-rated health (reference fair)					
Excellent	-1.502	0.752	0.2	0.04	0.05-0.97
Confidence scale	-0.329	0.133	0.7	0.01	0.55-0.93

χ2= 18.954, *p<0.001,* Nagelkerke R2=0.25

Discussion

The main aim of this study was to examine the predictors of driving reduction among older drivers and if they differ by gender. Around 70% of participants reported that they have reduced their driving compared to ten years ago. Previous studies demonstrate that older women are more likely to self-regulate their driving when compared to older men (Kostyniuk & Molnar, 2008). In our study reduction of driving was significantly more prevalent among males than females (78.1% vs. 57.6%). However, females reported significantly greater avoidance than males in a number of challenging driving situations which is consistent with other studies (driving in the rain (Rosenbloom & Herbel, 2009) and merging (Charlton et al., 2006). Regardless of gender, it appears that older drivers avoid a small number of driving situations. Men reported driving significantly more annual kilometres compared to women. For women, driving less annual kilometres was significantly associated with scores on the driving stress scale, driving confidence scale, and driving relinquishment scale.

Overall, females reported significantly higher driving stress and less driving confidence compared to males. Older women often report lack of confidence in their driving abilities and report that driving is stressful (Kostyniuk & Molnar, 2008).   However, there were no significant differences in self-rated quality of driving between males and females with the majority of participants reporting higher scores on the PDA scale. Previous studies have reported that older drivers tend to overrate their driving abilities and performance (Ackerman et al., 2011).

The results of the binary logistic regression showed that predictors of driving reduction differ between males and females. For men, the importance of driving was the only significant predictor in the final model. Men, regardless of their age, view driving as key to their independence and freedom (Rosenbloom & Herbel, 2009). For women, self-rated health was a significant predictor for driving reduction. Several health and physical functioning measures have been longitudinally associated with later cessation of driving (Anstey, Windsor, Luszcz, & Andrews, 2006).   However, older drivers' perceptions of their health conditions and how they impact their driving are far more important factors than their objective health condition (Anstey, Wood, Lord, & Walker, 2005), and there is evidence suggesting that older women give up driving earlier than they should and impose unnecessary restrictions on their mobility (Siren et al., 2004). The other significant predictor for driving reduction among older women was driving confidence. Numerous studies points out to the significant association between self-reported driving confidence/comfort and driving behaviour (Blanchard & Myers, 2010). This also could be the reason why female are more likely to self-regulate or stop driving than men (probably prematurely) (Siren & Meng, 2013) as they report loss of confidence as the reason they give up driving more than males do (McNamara, Chen, George, Walker, & Ratcliffe, 2013).

Previous literature has suggested that in the future, older women may rely more on their private cars for their mobility and will be more reluctant to give up driving compared to current and past generations of older women (Rosenbloom & Herbel, 2009). The findings in this study indicate that the gender gap may be narrowing and that as more women are living alone, driving is becoming extremely important to maintain their independence.

This study had some limitations. The recruitment strategy may have attracted relatively more active and healthier drivers; cognitive functioning was not assessed; very few participants reported that they were involved in a crash recently which made it difficult to explore this variable; and the study employed a cross-sectional design. Further, the study relied on self-report measures of driving behaviour. Recent findings suggest that self-report measures of driving behaviours don't match objective measures of real-world driving. For instance, older drivers cannot accurately estimate their driving distances (Huebner, Porter, & Marshall, 2006) and they tend to drive more frequently in challenging situations than what they actually report (Blanchard & Myers, 2010).

The results from this study are consistent with previous findings that show self-rated driving confidence is a significant predictor of driving regulation among older females. Interestingly, females were less likely than males to reduce their driving. This could mean that the gender gap may be narrowing. Further research is needed to investigate driving reduction among female drivers. In addition, in-depth qualitative research is needed to capture the reasons why older women reduce and/or stop driving and how this impacts their mobility needs.

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