Sex differences are evident in self-reported but not naturalistic measurement of driving patterns of older drivers: implications for safe driving programs

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Abstract

It has been consistently reported that women self-regulate their driving more than men. Volunteer drivers aged 75 years and older from the suburban outskirts of Sydney, Australia joined a longitudinal study in 2012-2014. GPS in-vehicle monitoring was used to objectively measure driving and surveys of driving patterns. The study included 343 drivers (203/343, 59% men) with an average age of 80 years. Our results revealed that men were 3.85 times more likely to report driving beyond their local shire during the past year (95% CI 2.03-5.72) and 1.81 times more likely to report that they do not avoid night driving (95% CI 1.21-3.22). In contrast sex was not predictive of any objective measure of driving during a one-week period of monitoring. These findings suggest that men and women report different self-regulation practices but that actual driving exposure is quite similar. These findings can inform strategies to promote safe mobility.

Background

Self-regulation has been proposed as a means to increase safety on the road while preserving independent mobility (Oxley and Whelan 2008). Self-regulation has been defined as intentionally adjusting driving exposure to match driving ability and confidence (Molnar and Eby 2008) and there is a substantial body of literature examining the predictors of self-regulation. Wong and co-authors (2016) published a systematic review investigating the factors which predict self-regulation, summarised findings from 29 studies and found that most studies found women were more likely than men to practice self-regulation. However, few studies have used objective measures of driving to estimate self-regulation (Wong, Smith et al. 2016). Objective measures or naturalistic driving assessment is emerging as the gold standard in research into driving behaviour.

While there are strong associations between sex and self-reported driving, the relative strength of the association of sex to objectively measured driving behaviour is not known. We sought to examine the influence of sex on both self-reported and objectively measured driving in a large group of older drivers.

Methods

We measured driving exposure objectively using an in-vehicle monitoring device and through self-report in a community-based sample of 380 drivers aged 75 years and older who resided in the suburban outskirts of Sydney, Australia. The influence of sex on driving patterns was investigated, adjusting for age, self-reported comorbidities (Groll, To et al. 2005) and performance on a global measure of visual and cognitive function, the DriveSafe/DriveAware assessment tool (Kay, Bundy et al. 2012).

The Short Portable Mental Status questionnaire was also used to screen for cognitive impairment and a score of >2 was used as criteria for exclusion (Pfiefer 1975). The study protocol was approved by the University of Sydney Human Research Ethics Committee (10-2011/14235) and all participants signed a record of informed consent.

Self-reported measures of driving exposure included the furthest distance driven in the past year (driving space) from the Driving Habits Questionnaire (Owsley, Stalvey et al. 1999) and self-reported avoidance of night driving (Baldock, Mathias et al. 2006). Objective measures of driving distance, driving space (radius of travel from home) and night driving were recorded using an in-vehicle monitoring device.

Linear regression was used to assess the relationship between predictors and total kilometres travelled and logistic regression for the binary outcomes.

Results

We enrolled 380 drivers into our research study and instrumented 362/380 (95%) vehicles. The data in our reference week of driving were scrutinized for reliability and the final analytic data set was 343 participants. The average age was 80 years (range 75-94 years) and 59% were male.

We recorded a median of 109km of driving during the 1-week period of monitoring. During the 1 week of monitoring, close to one-quarter of the drivers (81/342, 23%) drove at least 20km away from home. When the participants were asked about their driving in the preceding year, three-quarters (288/343, 76%) reported that they had driven beyond their local shire. Night driving was relatively uncommon with only half of the group recording any driving outside daylight hours (172/343, 50%) during 1 week of monitoring and 70% of the participants reported that they did not avoid night driving (267/343).

Sex was a dominant predictor of self-reported measures driving behaviour. Men were twice as likely to report not avoiding night driving (OR 1.81, 95% CI 1.21-3.22), and four times more likely to report driving beyond their local shire in the last year (OR 3.85, 95% CI 2.03-5.72). For the objective measures, sex was not predictive of total driving distance, distance from home or night driving.

Conclusions

We report a strong association between sex and self-reported driving exposure but no association between sex and objective measurement of total distance driven, radius of travel from home and night driving among a large group of older drivers living in the community. These results call into question sex differences in driving patterns. It is possible that while more women report restricting their driving that actual driving practices are quite similar between men and women.

The fact that men and women report different self-regulatory practices may have implications for designing strategies to promote safety or helping older people to stay mobile in the face of loss of confidence or declining physical function. This study contributes to our understanding of the nature of self-reported and objectively measured driving behaviour, a methodology being used more frequently in research into driver safety. Naturalistic assessment of driving is preferred as an objective measure of driving and this study suggests that older men and women do not differ in the distances travelled, distance from home and driving at night, despite men being more likely to report that they drive further from home and do not avoid night driving.

References

Baldock, M. R., J. L. Mathias, A. J. McLean and A. Berndt (2006). Self-regulation of driving and its relationship to driving ability among older adults. *Accid Anal Prev* 38(5): 1038-1045.

Groll, D. L., T. To, C. Bombardier and J. G. Wright (2005). The development of a comorbidity index with physical function as the outcome. *J Clin Epidemiol* 58(6): 595-602.

Kay, L. G., A. C. Bundy, L. Clemson, B. Cheal and T. Glendenning (2012). Contribution of off-road tests to predicting on-road performance: a critical review of tests. *Aust Occup Ther J* 59(1): 89-97.

Molnar, L. J. and D. W. Eby (2008). The relationship between self-regulation and driving-related abilities in older drivers: an exploratory study. *Traffic Inj Prev* 9.

Owsley, C., B. Stalvey, J. Wells and M. E. Sloane (1999). Older drivers and cataract: driving habits and crash risk. *J Gerontol A Biol Med Sci* 54.

Oxley, J. and M. Whelan (2008). It cannot be all about safety: the benefits of prolonged mobility. *Traffic Inj Prev* 9(4): 367-378.

Pfiefer, E. (1975). A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *J Am Geriatr Soc* 23.

Wong, I. Y., S. S. Smith, K. A. Sullivan and A. C. Allan (2016). Toward the Multilevel Older Person's Transportation and Road Safety Model: A New Perspective on the Role of Demographic, Functional, and Psychosocial Factors. *J Gerontol B Psychol Sci Soc Sci* 71(1): 71-86.

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