

DriveSafe and DriveAware Assessment Tools Are a Measure of Driving-Related Function and Predicts Self-Reported Restriction for Older Drivers

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Abstract

Safety concerns together with aging of the driving population has prompted research into clinic-based driving assessments. This study investigates the relationship between the DriveSafe and DriveAware assessments and restriction of driving. Community-dwelling adults aged more than 75 ($n = 380$) were recruited in New South Wales, Australia. Questionnaires were administered to assess driving habits and functional assessments to assess driving-related function. Self-reported restriction was prevalent in this cross-sectional sample (62%) and was related to DriveSafe scores and personal circumstances but not DriveAware scores. DriveSafe scores were correlated with better performance on the Trail-Making Test (TMT; $\beta = -2.94$, $p < .0001$) and better contrast sensitivity ($\beta = 48.70$, $p < .0001$). Awareness was

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associated with better performance on the TMT ($\beta = 0.08, p < .0001$). Our data suggest that DriveSafe and DriveAware are sensitive to deficits in vision and cognition, and drivers with worse DriveSafe scores self-report restricting their driving.

Keywords

older drivers, driving, assessment tool

In Australia, as in other high income countries, the proportion of drivers more than 70 years of age is expected to rise rapidly in coming years as adults continue driving later in life (Australian Bureau of Statistics, 2010, 2012). As older adults increasingly rely on driving for transport, it is important to preserve both safety and independence to promote healthy aging. Driving cessation has been linked to various negative health outcomes including depression, cognitive declines, and early entry into care facilities (Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2008; Friedland & Rudman, 2009; Marottoli & Coughlin, 2011).

Drivers who self-regulate intentionally restrict or modify their driving to match their function and comfort levels (Charlton et al., 2006). Older drivers may restrict their driving through reduced driving radius or avoidance of specific situations of increased risk (Baldock, 2004). Drivers may also modify driving habits such as travel times, frequency, routes, and routines to improve comfort and perceived safety. Many studies have demonstrated links between reduced function and restrictions on driving (Braitman & Williams, 2011; Freeman, Munoz, Turano, & West, 2006; Keay et al., 2009). It has been proposed that safety of older drivers can be enhanced through self-regulation (Charlton et al., 2006). While self-regulation is important, some research has suggested that awareness of driving ability precedes self-regulation (MacDonald, Myers, & Blanchard, 2008). Recent studies report a relationship between perceived driving ability and extent of driving using objective measures (Blanchard & Myers 2010). Other research suggests self-regulation may be more closely related to comfort, confidence, lifestyle, or personal preferences than awareness of driving-related abilities (Blanchard & Myers., 2010; Meng & Siren, 2012; Molnar et al., 2013). Female gender has also been linked to increased self-restriction among older drivers in a number of studies (Gwyther & Holland, 2011; Morgan, Winter, Classen, McCarthy, & Awadzi, 2009; Okonkwo, Wadley, Crowe, Roenker, & Ball, 2007).

Functional deficits in older drivers, including visual, cognitive, and hazard perception abilities, have been linked to increased crash involvement (Horswill, Anstey, Hatherly, & Wood, 2011; Rubin et al., 2007; Stutts,

Stewart, & Martell, 1998). Although on-road assessments are the reference standard for assessing driving ability (Kay, Bundy, Clemson, Cheal, & Glendenning, 2012), the increasing number of older drivers, time, and costs involved exemplify the need for an off-road measure of driving safety to reduce the number of on-road assessments needed. Such tools include the Useful Field of View (UFOV®) (Ball, Owsley, Sloane, Roenker, & Bruni, 1993), Hazard Perception Test (Horswill et al., 2010), and Trail-Making Tests (TMT; Betz & Fisher, 2009). Multiple studies have compared the validity and utility of such assessments in predicting driving function and safety (Classen, Wang, Crizzle, Winter, & Lanford, 2013; Wood, Horswill, Lacherez, & Anstey, 2013). The DriveSafe and DriveAware (Pearson Australia Group Pty Ltd, Sydney, Australia) assessment tool was developed in Australia to assess visual attention in a series of driving scenes, while considering awareness of driving-related ability (Kay, Bundy, & Clemson, 2009).

In this study, we investigate the relationship between the DriveSafe and DriveAware, and separate measures of visual and cognitive functions in a sample of community-dwelling older adults. DriveSafe and DriveAware assessment tools have been validated against on-road driving performance in drivers with cognitive impairment (Kay et al., 2009); however, there is limited research regarding how it relates to restriction of driving exposure and this study seeks to fill this gap. Many older people intend driving throughout their life course and this manuscript focuses on drivers aged 75 years and older who are living in the community and relying on driving. The purpose of this manuscript is to determine which aspects of function are measured in the DriveSafe and DriveAware assessments and thereby better understand this in-office test in this context. While it is well-established that function is related to driving habits, we consider whether awareness of driving ability (DriveAware) and personal circumstances also affect the relationship between driving-related function (DriveSafe) and self-reported restriction of driving for older drivers in the community.

Method

Study Design

Cross-sectional data from baseline assessments of a randomized control trial (RCT) exploring the effectiveness of an education program for older drivers (Keay et al., 2013) were used for the current study. Data were collected in participants' homes by one of three trained research assistants and involved oral administration of questionnaires and a functional assessment battery. Each visit lasted between 1 and 2 hr. Ethics approval was gained through the

Human Research Ethics Committee of the University of Sydney (Protocol: 14235), and all participants signed a written record of informed consent before participating.

Participants

For the RCT, a convenience sample of 380 eligible community-dwelling adults was recruited from four local government areas (municipalities) in Sydney, New South Wales (NSW). Recruitment was completed through advertisements in local newspapers, churches, doctors' surgeries, community groups, and letters distributed through a NSW motoring organization. Interested individuals were screened for eligibility via telephone. To meet inclusion criteria, participants were required to be licensed drivers aged 75 years or older (licenses were sighted to confirm status), the main driver of their own car, speak conversational English, and live in one of the specified municipalities. In the local jurisdiction, drivers aged more than 75 require medical clearance prior to license renewal (Roads & Maritime Services, 2013a), and we confined our study to this sub-group where off-road assessment of fitness to drive is of particular interest. Participants were excluded if cognitive screening suggested moderate to severe cognitive impairment (greater than two errors on the Short Portable Mental Status Questionnaire) as this may have precluded engagement in the planned educational program (Keay et al., 2013). A structured questionnaire was administered to gather demographic information including address, which was later classified as either rural- or urban-based on municipality zoning. A self-report comorbidity index (Groll, To, Bombardier, & Wright, 2005) identified the number of comorbidities.

Measures

DriveSafe. In the DriveSafe assessment, participants view a series of 11 photographs of road scenes for 3 s. After viewing each scene they are required to identify objects (vehicles and pedestrians) in the scene. Participants are required to report each object's position and direction of travel. The test is scored out of 128 and is based on the number of details correctly identified. Scores 76 or less indicate high-risk drivers, 77 to 95 indicate the need for further assessment, and more than 95 suggest there is no concern regarding driving ability. These parameters for predicting driver safety may be modified by awareness of driving-related ability as assessed by DriveAware. These scores and interpretations have previously been validated against on-road performance in a cognitively impaired population (Kay et al., 2009). We

use the DriveSafe data as a continuous variable in this analysis but report the proportions within each category for descriptive purposes.

DriveAware. The DriveAware assessment measures the accuracy of perceived driving ability and involves seven questions relating to driving performance. Participants' answers are compared with a clinician's rating, which is based on participants' responses throughout the assessment, and given a discrepancy score between 0 and 4. Participants receive a total score between 3 and 26. Scores of 3 to 12 indicate intact awareness with higher scores suggesting impaired awareness. DriveSafe and DriveAware scores have been proposed to be used in combination to predict drivers who are likely safe, unsafe, or require further testing (Kay et al., 2009).

Driving Habits Questionnaire (DHQ). The DHQ (Owsley, Stalvey, Wells, & Sloane, 1999) was used as a self-report measure for participants' driving practices. Data included furthest distance driven in the past year (driving space), driving preference (preferring to drive rather than use alternative transport), driving dependence (presence of alternative drivers), and whether the participant is responsible for driving others. Driving space was scored on a 5-point scale: within home suburb, within own municipality, neighboring suburbs outside own municipality, up to 2 hr away, outside greater Sydney (more than 2 hr away). Driving space was collapsed into two groups for analysis: those who drove only within their home municipality and those who drove outside their home municipality. This measure was completed prior to the administration of DriveSafe and DriveAware.

Driving Confidence and Avoidance Scales. Self-reported driving avoidance was another measure of driving restriction. Avoidance was measured using the driving confidence scale (Baldock, Mathias, McLean, & Berndt, 2006) in which participants were asked whether they avoid any of 12 driving situations: driving alone, in the rain, at times of high glare (e.g., sunrise/sunset), reverse parallel parking, turning right, driving on freeways, high traffic roads, at night, at night in the rain, in school zones, or in peak hour, or driving long distances. Scores were totaled and participants grouped into those scoring above and below the median.

Visual and cognitive assessments. We selected additional tests of vision and cognition, which could be completed in a home assessment without considerable burden to study participants. These were included as we wanted to investigate the specific aspects of visual and cognitive function that are related to performance in the DriveSafe and DriveAware. Low contrast visual acuity was assessed using the Mars Letter Contrast Sensitivity chart (Mars Perceptrix

Corporation, 2003), and higher log scores indicated better contrast sensitivity, where scores of 1.52 to 1.76 fall within the normal range for adults more than 60 years. Poor contrast sensitivity has been associated with on-road driving errors (Dawson, Uc, Anderson, Johnson, & Rizzo, 2010) and increased crash risk (Ball et al., 1993). TMT Parts A and B assess psychomotor speed, executive function, and visual scanning ability and involve connecting a series of letters (Part A) and both letter and numbers (Part B). The TMT has been shown to be predictive of driving-related ability and crash risk with longer times indicating worse cognitive function (Asimakopulos et al., 2011; Unsworth, Lovell, Terrington, & Thomas, 2005).

Data Analyses

Descriptive statistics of the population were summarized using frequencies, means, and standard deviations. DriveSafe DriveAware scores were sorted according to published cutoff values (Kay et al., 2009), but the DriveSafe was used as a continuous variable in the regression models. Two separate multivariate linear regression models were completed to assess the relationship between age, gender, health, function, and DriveSafe and DriveAware scores. As predictive factors were likely to be correlated, these were examined in a correlation matrix with more highly correlated factors included in the multivariate analysis. All factors with $p < .2$ were included in an initial model and removed in a stepwise backward elimination process. Interactions were explored before a final model was identified.

DriveSafe scores were then evaluated as a predictor of self-reported restriction, specifically driving avoidance and reduced driving space, using logistic regression. The influence of intact awareness of driving ability (scores of 12 or less on DriveAware) was investigated using a second multivariate model. A third multivariate model included rural residence, preference to be the driver, presence of other drivers, and whether someone relies on the participant for transport. These factors were included as it has been proposed that they influence self-regulation (Donorfio et al., 2008). Statistical analyses were completed using SAS Enterprise Guide version 5.1 (SAS Institute Inc., 2012) with a significance level set at .05.

Results

Participants

Between July 2012 and October 2013, 380 participants were recruited to the current study. Two participants did not complete the DriveSafe DriveAware assessment as they withdrew from the study.

Table 1. Sample Demographics and Function of Community Dwelling Adults in Sydney Australia ($n = 380$).

	<i>M (SD)</i> ^a
Age (years)	80.19 (4.31)
Gender (male), <i>n</i> (%)	229 (60.53)
Country of birth, <i>n</i> (%)	
Australia	284 (74.74)
The United Kingdom	58 (15.26)
Other ^b	38 (10.00)
Language spoken at home (English), <i>n</i> (%)	377 (99.21)
Education (years)	13.37 (4.04)
Comorbidities	5.48 (2.70)
Receives assistance from an agency, <i>n</i> (%)	79 (20.79)
Receives family help, <i>n</i> (%)	20 (5.26)
Residence, <i>n</i> (%)	
Home	256 (67.37)
Granny flat	2 (0.53)
Unit	24 (6.32)
Independent living unit	71 (18.68)
Town house	8 (2.11)
Villa	14 (3.68)
Other	5 (1.32)
Trail-Making Test, Part A (s)	39.80 (14.83)
Trail-Making Test, Part B (s)	101.54 (49.27)
Contrast sensitivity (log contrast)	1.65 (0.10)

Note. Total number = 380. *SD* = standard deviation.

^aUnless otherwise stated

^bNew Zealand (8), Europe (14), China and Hong Kong (1), Middle East (1), other (14).

Our study included more males than females (60.5%) with ages ranging from 75 to 94 years ($M = 80$, $SD = 4$; Table 1). Most participants were born in Australia (74.7%), with an average of 13 years education. Participants in the study generally lived in urban areas (86.3%). Approximately one in five participants were receiving regular assistance from an agency for help with personal and/or instrumental activities of daily living ($n = 79$, 20.8%) with few receiving regular family help ($n = 20$, 5.3%).

Licensing

Most participants held an unrestricted car license (97.6%) with only nine holding conditional licenses. License conditions required a restricted radius

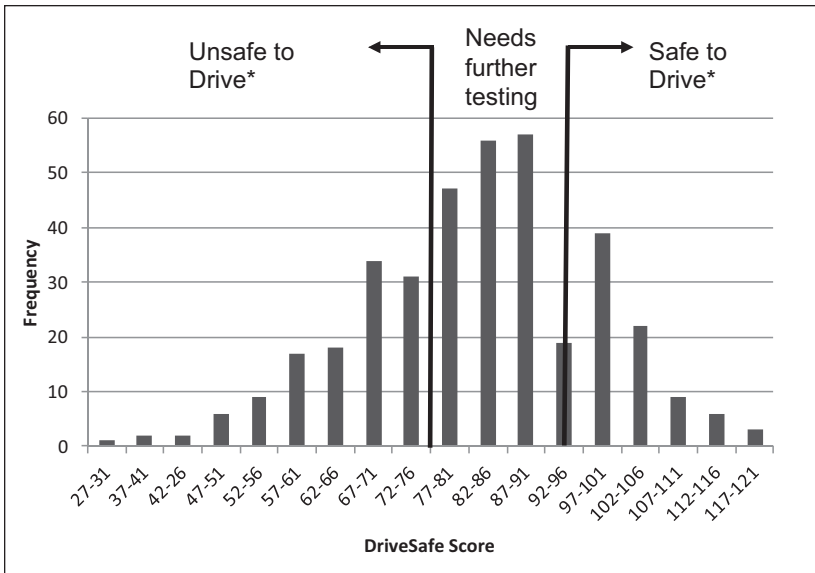


Figure 1. Distribution of DriveSafe scores in a community sample of drivers aged 75 years and older.

*Before adjusting for DriveAware score.

($n = 6$), driving during daylight hours ($n = 5$), driving an automatic transmission vehicle ($n = 2$), and use of a vehicle with custom modifications ($n = 1$) with some participants holding multiple restrictions. Conditions relating to use of eyeglasses were common and not recorded. Participants preferred to drive themselves (91.3%) with few relying on public transport or taxis (3.2%), or family or friends (4.5%).

DriveSafe DriveAware Scores

Scores on DriveSafe ranged from 28 to 119 (Figure 1), with an average of 82.6 ($SD = 15.4$). Participants scored an average of 12.6 ($SD = 1.6$) on the DriveAware with a range of 9 to 18. While 50% of participants scored more than 12 (indicating impaired awareness on DriveAware), only 3.4% scored more than 15 indicating moderate-severe impairment of awareness. A total of 120 out of the 378 participants scored below 76 on DriveSafe; however, only one participant remained in the “unsafe” category following adjustment based on DriveAware scores, with 291 (76.9%) in the “needs further testing” and 87 (23.0%) in the “safe” categories.

Table 2. Functional Predictors of DriveSafe and DriveAware Scores of Community Dwelling Adults in Sydney, Australia (n = 380).

Independent factors	Correlation coefficient							
	DriveSafe ^a				DriveAware ^b			
	Univariate		Multivariate		Univariate		Multivariate	
	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Age (5-year groups)	-5.27	<.0001	-2.98	.0010	0.52	<.0001	0.38	.0002
Gender (male)	5.77	.0004	5.98	<.0001	-0.40	.018	-0.43	.007
Comorbidities	-0.59	.0457	—	NS	0.06	.0425	—	NS
Trail-Making Test A (time to complete per 10 s)	-2.94	<.0001	Not used in multivariate		0.17	.0017	Not used in multivariate	
Trail-Making Test B (time to complete per 10 s)	-1.10	<.0001	-5.05	<.0001	0.08	<.0001	0.05	.0022
Contrast sensitivity	46.70	<.0001	30.34	.0002	-2.54	.0056	—	NS

Note. *p* = probability; NS = not significant.
^aHigher scores indicate better driving-related ability.
^bHigher scores indicate poorer awareness.

Self-Reported Restriction: Driving Space and Avoidance

Approximately one quarter of the sample (24.2%) reported restricting their driving to within their home municipality, and more than half (58.7%) avoided at least one situation. Participants who restricted through avoidance avoided an average of three situations. Approximately one third (38%) of participants did not report any avoidance or restriction of driving space.

Factors Associated With DriveSafe and DriveAware Scores

Age, gender, time to complete both parts of the TMT, and contrast sensitivity were all associated with DriveSafe scores (Table 2). The negative correlation between age and DriveSafe scores ($\beta = -5.27$) indicated that older participants generally had worse DriveSafe scores; however, the strength of this association reduced in the multivariate model when measures of function were included ($\beta = -2.98$). There were close associations between Parts A and B of TMT (Table 2). As TMT Part B was more predictive of DriveSafe (adjusted R^2 0.12 for Part B compared with 0.08 for Part A), it was used in the

Table 3. Relationship Between DriveSafe Scores (0-128) Per 5-Point Increase and Two Measures of Driving Restriction.

	<i>M</i> (<i>SD</i>)		Univariate	Multivariate Model 1 ^a	Multivariate Model 2 ^b
	Driving Space extended beyond shire in last 12 months				
	Within shire <i>n</i> = 91	Outside shire <i>n</i> = 287	OR [95% CI]	OR [95% CI]	OR [95% CI]
DriveSafe	78.1 ± 13.9	84.1 ± 15.7	1.13 [1.05, 1.22]	1.10 [1.002, 1.20]	1.13 [1.04, 1.22]
	No avoidance of driving situations				
	One or more situations avoided <i>n</i> = 222	No avoidance <i>n</i> = 156	OR [95% CI]	OR [95% CI]	OR [95% CI]
DriveSafe	80.4 ± 15.2	85.8 ± 15.2	1.12 [1.05, 1.21]	1.10 [1.02, 1.20]	1.12 [1.04, 1.20]

Note. *SD* = standard deviation; OR = odds ratio; CI = confidence interval.

^aAdjusting for intact awareness (DriveAware score of ≤ 12)

^bAdjusting for intact awareness, preference to be the driver, dependency on being the driver (no alternative drivers available), and whether someone relies on the participant for transport.

multivariate models. Low contrast sensitivity and TMT Part B were independently associated with lower scores on the DriveSafe assessment as were age and gender (Table 2). For DriveAware, only age, male gender, and time to complete TMT Part B remained predictive in multivariate models.

DriveSafe and Driving Restriction

DriveSafe scores were predictive of both restricted driving space and avoidance (Table 3). Better performance on DriveSafe (per 5-point increase) predicted driving space extending beyond the municipality (odds ratio [OR] = 1.13, 95% confidence interval [CI] [1.05, 1.22]) and no avoidance of driving situations (OR 1.12, 95% CI [1.05, 1.21]). After adjustment for awareness (DriveAware score) and personal circumstances (Table 3, Multivariate Model 1), there was little difference in the strength of association with DriveSafe (Table 2).

Discussion

In this study, we found that worse DriveSafe scores were associated with self-reported restriction of driving among community-dwelling older adults. To date, the clinic-based DriveSafe assessment had been validated against on-road assessment (Kay et al., 2009), but its relationship with self-reported driving restriction was unknown. The relationship between function and

self-reported driving restriction found in this study is in agreement with previous research exploring the link between function and driving restriction (Charlton et al., 2006). We acknowledge that self-restriction of driving may not be due to declining function, but rather due to lifestyle changes and preferences (Molnar et al., 2013). Although motivation for self-restriction among participants was not explored, it is re-assuring to note that participants with worse function reported reduced driving exposure. These results support self-regulation as a promising tool for helping older drivers safely maintain mobility in the community.

In this study, we also examined the relationship between visual and cognitive function and scores on the DriveSafe and DriveAware assessment tool, a clinic-based tool assessing driving ability. We found correlations between contrast sensitivity and time to complete the TMT, and DriveSafe scores. Although the DriveSafe measure does not deconstruct the component skills in the testing procedure (Kay et al., 2009), the correlations found suggest that the DriveSafe score is sensitive to changes in visual scanning, contrast sensitivity, and psychomotor speed as tested by the TMT and Mars letter chart.

An overall assessment of driving-related function removes the need to assess functional domains separately (e.g., vision, hazard perception) and has time benefits for driving assessors. Advancing age was predictive of low DriveSafe scores, supporting claims that age-related functional declines are associated with driving ability (Charlton et al., 2006). However, chronological age should not be considered in isolation as age associations with driving ability were weakened once other factors were considered.

The findings from our study suggest there is an association between gender and driving-related function. This association may be explained by the wider body of research suggesting differences in experience, attitudes toward driving, and driving exposure by gender within this population. Males in this age group have historically been the primary driver within their households and female drivers less likely to have as much previous driving exposure (Hakamies-Blomqvist & Siren, 2003). Differences in overall driving experience and reasons for driving are believed to affect familiarity with road rules, confidence, and reliance on driving, which in turn would affect results on driving assessments, as found in this study. Males scored better on the DriveSafe measure but had poorer awareness of ability as scored on the DriveAware measure. Better results on hazard perception components and poorer results on self-awareness may be due to gender differences because males are generally considered to have greater spatial awareness yet are less self-reflective. These results still need further exploration regarding why gender influences driving-related abilities and its impact on restriction of driving behaviors.

The association between scores on the TMT and DriveAware suggests that older adults with cognitive decline may be less able to recognize their limitations in driving-related abilities (Meng & Siren, 2012). However, we excluded participants with significant cognitive impairment so our findings cannot be extrapolated to the impact of more severe cognitive impairments on awareness of driving-related abilities. The lack of association with contrast sensitivity is not surprising as vision is not logically related to awareness.

DriveSafe cutoff scores identified a sub-group (approximately one quarter of the sample) of currently licensed drivers who were classified as requiring further testing to definitively determine fitness-to-drive. Shechtman, Awadzi, Classen, Lanford, and Joo (2010) identified that a significant proportion of licensed drivers, adults aged more than 65 (18%), failed an on-road test, supporting the need for further testing of currently licensed drivers. Although modifications to license status may improve on-road safety, education or awareness building regarding functional deficits may also be effective strategies (Stalvey & Owsley, 2003). Such education programs may include awareness building; however, we found a majority of drivers with poor function had adequate awareness, based on DriveAware scores, and therefore may require more practical skills, including guidance in planning for self-regulation and driving cessation. Further exploration is needed regarding how assessment may be used to inform interventions to improve safety and promote adequate driving regulation and is the subject of further research in this study population (Keay et al., 2013).

Although it has been proposed that awareness could alter associations between function and driving restriction, our results did not demonstrate this. There are limitations in administering the DriveAware in a research setting. These include limited awareness of participants' medical conditions prior to completing the DriveAware and asking participants the purpose of the assessment after obtaining informed consent. These limitations may have skewed results, biasing the sample toward better scores of awareness. As impaired awareness was defined by a conservative cutoff of 12 on the DriveAware, it is possible that awareness of ability was not reliably assessed in this study, therefore masking the influence of driving awareness on our findings. Further research is needed to investigate the application of the DriveAware in different populations to better understand how driving awareness scores relate to restriction of driving.

This study found relationships between personal factors, such as living in rural areas, having dependents who need to be driven or having no alternative drivers in the household, and driving restrictions similar to those reported in previous research (Festa, Ott, Manning, Davis, & Heindel, 2013; Keay et al., 2009). Baldock et al. (2006) and MacDonald and colleagues (2008)

suggested that restriction of driving is linked to driving-related function. These studies supported our findings of the associations between poor DriveSafe scores and increased restriction of driving. Although personal factors such as driving dependence were individually predictive of driving restriction, they did not interact strongly with other variables within the multivariate analyses.

Limitations

The use of convenience sampling meant sample characteristics did not represent those of the general population. Males were overrepresented in our sample with 61% in our study compared with 55% of current drivers in this age group (Roads and Maritime Services, 2013b). Non-English speakers and cognitively impaired individuals were excluded from the sample. These differences limit the generalizability of our findings. Research investigating awareness and driving restriction in cognitively impaired individuals has already been completed (e.g., Rapoport et al., 2013); however, there is scope for further research in these areas.

This study relied heavily on self-report for the primary outcomes, which may result in recall or reporting bias. Objective data using naturalistic measures of driving exposure would provide accurate information on driving space and restrictions and should be used in future studies. Blanchard and colleagues (Blanchard, Myers, & Porter, 2010) recommend that electronic data capture provides important, objective additional information to that collected through self-report. The cross-sectional design also limits the ability to identify causative associations of DriveSafe and DriveAware scores. For example, the question of whether poor function leads to driving restriction or driving restriction leads to decline in driving function remains unanswered. Longitudinal data would be helpful in determining whether scores predict future driving restriction.

Our study did not include all factors that have been linked to self-regulation in previous studies; however, the assessment battery was developed based on previous literature and practical considerations regarding administration. The sample size and nature of the statistical analysis limited the number of variables able to be used without producing a false-positive result. We acknowledge that self-regulation is a complex process, and the scope of this study was too small to comprehensively assess all variables that may be predictors of restriction and the intent of these behaviors (Molnar et al., 2013). However, our study size and design were appropriate to the aim of investigating the utility of the DriveSafe and its relation to driving restriction, adjusting for awareness and contextual factors.

Finally, due to limitations in funding and resources, no on-road driving assessments were used. Although the DriveSafe and DriveAware assessment tool has been validated against on-road performance (Kay et al., 2009), the lack of on-road assessments in this study limits the understanding of how the factors investigated influence on-road performance. DriveSafe is a measure of predicted on-road safety and is related to poor performance on assessments of contrast sensitivity, psychomotor speed, visual scanning, and executive function. The DriveAware identifies individuals with impaired awareness of their driving ability and was found to be related to poorer cognition in this group. The relationships between self-reported driving habits and DriveSafe scores gave further content validity to this assessment tool. Further research is needed to determine the clinical application of these findings and how DriveSafe and DriveAware scores may inform licensing and direct support for older people transitioning out of driving.

Conclusion

The DriveSafe and DriveAware assessment tool has been found to correlate to changes in contrast sensitivity, executive function, and age among older drivers. These factors have also been linked to driving habits of older adults and further support the content validity of this measure for predicting on-road safety. In this study, we found that older drivers with worse function drive less, stay closer to home, and tend to avoid more challenging driving situations. This result supports the use of self-regulation as a key strategy for keeping older drivers safe on the road for as long as possible.

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Declaration of Conflicting Interests

The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Anita Bundy is a co-author of the DriveSafe and DriveAware assessment tools and receives royalties.

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