



Identifying compensatory driving behavior among older adults using the situational avoidance questionnaire[☆]

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ARTICLE INFO

Article history:

Received 30 May 2017

Received in revised form 29 July 2017

Accepted 17 August 2017

Available online 24 August 2017

Keywords:

Driving self-regulation

Older drivers

Situational avoidance

Hazard perception

ROC analysis

ABSTRACT

Introduction: Driving self-regulation is considered a means through which older drivers can compensate for perceived declines in driving skill or more general feelings of discomfort on the road. One form of driving self-regulation is situational avoidance, the purposeful avoidance of situations perceived as challenging or potentially hazardous. This study aimed to validate the Situational Avoidance Questionnaire (SAQ, Davis, Conlon, Ownsworth, & Morrissey, 2016) and identify the point on the scale at which drivers practicing compensatory avoidance behavior could be distinguished from those whose driving is unrestricted, or who are avoiding situations for other, non-compensatory reasons (e.g., time or convenience). **Method:** Seventy-nine Australian drivers ($M_{age} = 71.48$, $SD = 7.16$, range: 55 to 86 years) completed the SAQ and were classified as a *compensatory-restricted* or a *non-restricted driver* based on a semi-structured interview designed to assess the motivations underlying avoidance behavior reported on the SAQ. **Results:** Using receiver-operator characteristic (ROC) analysis, the SAQ was found to have high diagnostic accuracy (sensitivity: 85%, specificity: 82%) in correctly classifying the driver groups. Group comparisons confirmed that compensatory-restricted drivers were self-regulating their driving behavior to reduce the perceived demands of the driving task. This group had, on average, slower hazard perception reaction times, and reported greater difficulty with driving, more discomfort when driving due to difficulty with hazard perception skills, and greater changes in cognition over the past five years. **Conclusions:** The SAQ is a psychometrically sound measure of situational avoidance for drivers in baby boomer and older adult generations. **Practical applications:** Use of validated measures of driving self-regulation that distinguish between compensatory and non-compensatory behavior, such as the SAQ, will advance our understanding of the driving self-regulation construct and its potential safety benefits for older road users.

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1. Introduction

Like other western countries, older adults comprise the largest and fastest growing segment of Australia's driving population (Australian Bureau of Statistics, ABS, 2016). Age- and disease-related declines in physical, cognitive and sensory abilities underlie the critical driving errors unique to older drivers (Anstey & Wood, 2011; Anstey, Wood, Lord, & Walker, 2005; Cicchino & McCartt, 2015; McGwin & Brown, 1999), and their physical frailty contributes to a heightened risk of serious injury or death if involved in a motor-vehicle accident (Koppel, Bohensky, Langford, & Taranto, 2011; Li, Braver, & Chen, 2003). However, the relative crash risk of older drivers is not as high as one might expect based on the functional declines commonly experienced with age (Langford & Koppel, 2006a). One reason is that many older adults

gradually and voluntarily modify their driving over time to compensate for declines in driving skills, often culminating in deciding to stop driving altogether (Hakamies-Blomqvist, Siren, & Davidse, 2004; Langford & Koppel, 2006b; Smiley, 2004). This behavior has been referred to as *driving self-regulation*. The diversity in normal and pathological ageing (Christensen, 2001), coupled with the negative outcomes associated with driving cessation (e.g., Edwards, Perkins, Ross, & Reynolds, 2009; Fonda, Wallace, & Herzog, 2001; Marottoli, Mendes de Leon, et al., 1997; Marottoli et al., 2000), have led some to conclude that ultimate responsibility must remain with the driver (Berry, 2011), and that ways to support and promote the practice of driving self-regulation by older drivers should form an integral part of any regulatory system (Hakamies-Blomqvist & Wahlstrom, 1998; Langford, 2006).

Driving self-regulation has been defined as a process initiated by older adults to improve the fit between perceived declines in driving skills and the driving environment (Ball et al., 1998; Charlton et al., 2006; Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2009). Examples include decisions concerning where to live or what vehicle to drive (Eby, Molnar, & Kartje, 2009; Molnar, Eby, Langford, et al., 2013), as well as behaviors such as reducing driving exposure and driving space (Charlton et al., 2006; Lyman, McGwin, & Sims, 2001; Rosenbloom,

[☆] Conflicts of interest and sources of funding: there are no conflicts of interest to declare by any of the authors. No specific funding was utilised in conducting this study or preparing this manuscript. The first author was supported by an Australian Postgraduate Research Scholarship.

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2004), avoidance of driving in situations perceived as challenging or more difficult (e.g., driving at night or in bad weather) (Baldock, Mathias, McLean, & Berndt, 2006a; Ball et al., 1998; Keay et al., 2009; Molnar et al., 2014; West et al., 2003), driving more slowly or leaving longer headways while on the road (Andrews & Westerman, 2012; Charlton, Catchlove, Scully, Koppel, & Newstead, 2013; Molnar et al., 2014), and altered visual search patterns (Charlton et al., 2005). As such, it is composed of different strategies occurring across the levels of driving behavior or decision-making (Michon, 1985; Smiley, 2004).

The practice of driving self-regulation among older drivers has been associated with advanced age, female gender and reduced motor vehicle crash involvement (Ball et al., 1998; Ball, Owsley, Sloane, Roenker, & Bruni, 1993; Braitman & McCartt, 2008; Conlon, Rahaley, & Davis, 2017; Davis et al., 2016; Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2008; Hakamies-Blomqvist & Wahlstrom, 1998; Kostyniuk & Molnar, 2008; Molnar & Eby, 2008; Oxley, Charlton, & Fildes, 2003; Ross et al., 2009; West et al., 2003). Drivers who report greater difficulty with driving or driving-related skills, reduced confidence and greater discomfort on the road are also more likely to report self-regulating their driving behavior (Baldock et al., 2006a; Conlon et al., 2017; MacDonald, Myers, & Blanchard, 2008; Molnar et al., 2014; Myers, Paradis, & Blanchard, 2008). Perhaps more importantly, the crash profile of older drivers reflects their typical self-regulation patterns, with underrepresentation in crashes occurring in difficult conditions (e.g., at night or in bad weather) and those caused by risky internal states (e.g., intoxication or distraction) (Hakamies-Blomqvist, 1993; Langford & Koppel, 2006a).

However, some studies have failed to find an association between driving self-regulatory behavior, such as situational avoidance, and on-road driving performance or objective measures of ability (Baldock et al., 2006a; Baldock, Mathias, McLean, & Berndt, 2006b; Okonkwo, Crowe, Wadley, & Ball, 2008; Ross et al., 2009). For example, Horswill, Anstey, Hatherly, Wood, and Pachana (2011) found that self-reported situational avoidance was not associated with mean hazard perception reaction time. Hazard perception has been identified as a critical skill for crash avoidance as one must first recognise a potentially hazardous situation in order to take evasive action (Horswill & McKenna, 2004). The Hazard Perception Test is one of the few computer-based measures to predict crash involvement of drivers of all ages, suggesting it is an appropriate proxy measure of on-road safety (Horswill, Anstey, Hatherly, & Wood, 2010; see Horswill & McKenna, 2004, for a review). These findings have prompted research into whether older drivers are able to self-regulate their driving in a manner consistent with their actual driving ability.

According to existing driving self-regulation models (e.g., Anstey et al., 2005; Rudman, Friedland, Chipman, & Sciortino, 2006; Wong, Smith, Sullivan, & Allan, 2014) and theories of behavior change (e.g., the Transtheoretical Model of Behavior Change, Prochaska & Velicer, 1997; and the Precaution Adoption Process Model, Kostyniuk, Shope, & Molnar, 2001), driving behavior change is often predicated on an older adult's awareness of changes in driving-related skills and general beliefs about their ability to perform a specific task, for example, their confidence in their ability to drive safely at night. As they become aware of potential problems, either through self-assessment or via feedback from external sources, their driving practices may be adjusted (Ackerman et al., 2011; Eby, Molnar, Shope, Vivoda, & Fordyce, 2003; Kowalski, Jeznach, & Tuokko, 2014; Rudman et al., 2006). The decision to change driving behavior can also be influenced by attitudes toward driving (e.g., enjoyment of driving) and its perceived importance to one's lifestyle (Baldock et al., 2006a; D'Ambrosio, Donorfio, Coughlin, Mohyde, & Meyer, 2008; Donorfio et al., 2008; Friedland & Rudman, 2009; Sukhawathanakul et al., 2015). Contextual factors further determine actual driving behavior through, for example, the availability of suitable alternate transport options or the needs of dependent others (Charlton et al., 2006; Donorfio

et al., 2009; Stalvey & Owsley, 2000). Thus, intrapersonal, interpersonal and environmental factors work together to determine an older adult's readiness or willingness to self-regulate driving in the context of perceived changes in driving skill.

Driving behavior may also be determined by other, non-compensatory reasons such as changes in lifestyle or for convenience (Kowalski et al., 2014; Molnar, Eby, Charlton, et al., 2013). For example, the greater freedom afforded by retirement might allow an older adult to choose to drive a longer route to avoid a congested city centre or wait until the rain stops to go to their local store. This type of behaviour does not fall within the scope of *driving self-regulation* as it is defined in road safety research, and failing to consider the reasons for changes in driving behavior may have confounded the results of some previous studies (Molnar, Eby, Charlton, et al., 2013; Molnar et al., 2015). Specifically, one would not expect a significant relationship between avoidance for convenience reasons and measures of driving ability or crash involvement. The challenge for researchers lies in our ability to adequately capture the many reasons for driving behavior change, with consideration of the idiosyncrasies in how these reasons are expressed or understood by older adults, and sensitivity to the fact that the reasons may be different for different driving behaviors (Dellinger, Sehgal, Sleet, & Barrett-Connor, 2001; Molnar et al., 2015).

The results of our recent study suggest that drivers practicing compensatory driving self-regulation may be identified based on where they fall on the avoidance continuum measured using the Situational Avoidance Questionnaire (Davis et al., 2016). It was hypothesised that the higher the score on the SAQ Avoidance Scale, the more likely the avoidance reported was a form of compensation for perceived declines in driving skill. The aim of the current study was to test this hypothesis and to identify a SAQ cut-off score to distinguish older drivers more likely to be practicing compensatory driving behavior from those reporting avoidance for non-compensatory reasons. To achieve this aim, drivers were classified as compensatory-restricted or non-restricted following a semi-structured interview in which they disclosed their reasons for situational avoidance reported on the SAQ. The sensitivity and specificity of the SAQ in classifying these two groups was determined through receiver operator curve (ROC) analysis. Finally, the cut-off score was validated by comparing the groups on variables commonly associated with driving self-regulation in the literature (e.g., age, gender, driving confidence and self-reported cognitive difficulties).

2. Method

2.1. Participants

A sample of 79 adults (36 males, 45.6%), ranging in age from 55 to 86 years ($M = 71.48$, $SD = 7.16$), was recruited from a larger sample sourced from local community groups in regional Queensland, Australia. All participants reported possession of a current open drivers' licence. They were screened for low-level visual difficulties using the Snellen Visual Acuity Chart (Snellen, 1862; cited in Bennett, 1965) and Pelli-Robson Contrast Sensitivity Test (Pelli, Robson, & Wilkins, 1988). All scored at or above their relative age norms for contrast sensitivity (Elliott, Sanderson, & Conkey, 1990) and above 6/12 corrected vision in their better eye on the Snellen chart (Austroads, 2016). This study had University Human Research Ethics Committee approval, with all participants providing informed consent.

2.2. Measures

2.2.1. Driving behavior and beliefs questionnaire

This questionnaire consisted of demographic items (e.g., age, gender, and driving exposure) and a number of scales to assess situational avoidance and beliefs about driving. Participants also described involvement

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