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Older drivers' insight into their hazard perception ability

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ABSTRACT

Even though the driving ability of older adults may decline with age, there is evidence that some individuals attempt to compensate for these declines using strategies such as restricting their driving exposure. Such compensatory mechanisms rely on drivers' ability to evaluate their own driving performance. This paper focuses on one key aspect of driver ability that is associated with crash risk and has been found to decline with age: hazard perception. Three hundred and seven drivers, aged 65–96, completed a validated video-based hazard perception test. There was no significant relationship between hazard perception test response latencies and drivers' ratings of their hazard perception test performance, suggesting that their ability to assess their own test performance was poor. Also, age-related declines in hazard perception latency were not reflected in drivers' self-ratings. Nonetheless, ratings of test performance were associated with self-reported regulation of driving, as was self-rated driving ability. These findings are consistent with the proposal that, whileself-assessments of driving ability may be used by drivers to determine the degree to which they restrict their driving, the problem is that drivershave little insight into their own driving ability. This may impact on the potential road safety benefits of self-restriction of driving because drivers may not have the information needed to optimally self-restrict. Strategies for addressing this problem are discussed.

1. Introduction

According to the Multifactorial Model for Enabling Driving Safety (Anstey et al., 2005), the driving behaviour of older drivers is determined by both their capacity to drive safely and beliefs about their driving capacity (linked to self-monitoring). That is, while the capacity to drive safely may decline with increasing age, due to issues relating to cognitive, visual, and physical function, there may not be an equivalent change in driving behaviour because older drivers will notice that their capacity is declining and take compensatory action (such as restricting their driving to safer environments).

This proposal is supported by evidence that older drivers do indeed restrict their driving exposure across a range of situations (Baldock et al., 2006; Marottoli and Richardson, 1998; Molnar and Eby, 2008) and this appears to be driven by their level of confidence in their driving ability for at least some aspects of driving (Baldock et al., 2006). Unfortunately, there is also evidence that this compensation is not effective in eliminating increases in crash risk as a result of age-related declines. For example, Ross et al. (2009) found that those who performed poorly on a useful field of view test did restrict their driving but, despite this, were still twice as likely to be involved in an at-fault crash compared with those who performed well on the test. This raises the issue of why this self-regulation strategy is not as effective as it might be.

One reason why self-regulation strategies may fail to compensate for changes in crash risk is if drivers' self-monitoring ability is simply not accurate enough. Consistent with this proposal, Groeger and Grande (1996) found that a cross-age sample of drivers' ratings of their own driving ability did not correspond with objective measures of their driving ability. Also, like drivers of all ages, older drivers tend to exhibit a self-enhancement bias, considering themselves, on average, to be considerably better than the average (Freund et al., 2005; Marottoli and Richardson, 1998). Indeed, Freund et al. (2005) found that the higher that older drivers rated their expected performance in a driving simulator, the more likely they were to be rated unsafe when they actually drove in the simulator.

The present study focused on one specific aspect of driving ability: hazard perception (see Horswill and McKenna, 2004, for a review). Drivers' hazard perception has been defined as the ability to anticipate and respond to potentially dangerous situations on the road (Horswill et al., 2008). It was chosen because it has been associated with self-reported crash involvement in both retrospective (Darby et al., 2009; McKenna and Horswill, 1999; Quimby

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et al., 1986) and prospective (Wells et al., 2008) studies, including a retrospective study that focused on older drivers (Horswill et al., 2010a). Hazard perception has also been found to decline with age in a sample of drivers aged 65 and over (Wallis and Horswill, 2007).

In addition, drivers' self-monitoring of their hazard perception ability appears to be subject to the same problems as self-monitoring of driving ability in general. Farrand and McKenna (2001) found that young novice drivers' ratings of their hazard perception performance were not associated with their actual performance in a video-based test, even when this was evaluated on a scene-by-scene basis. Also, drivers from a cross-age sample (Horswill et al., 2004) have been found to rate their hazard perception abilities as better than the average driver and also better than their peers (where a peer was defined as someone of the same age, sex, education, training, experience, etc. as themselves). This illusion of superiority was found to be greater for hazard perception than for either overall driving skill or other aspects of driving skills such as vehicle control.

In sum, older drivers who demonstrate a diminished hazard perception capacity may be at greater risk of crashing. However, according to the Multifactorial Model for Enabling Driving Safety (Anstey et al., 2005), drivers may be able to moderate this risk if they can monitor their diminished capacity effectively, allowing them to regulate their driving appropriately. Whether this strategy can be effective for hazard perception depends on how accurate older drivers' self-monitoring for hazard perception is, and this is currently not known. For example, it is conceivable that the self-monitoring of older drivers may be better than drivers in general because they tend to have much greater experience.

The present study represents the first research to examine the extent to which older drivers' self-ratings of hazard perception ability correspond with an objective measure of their hazard perception ability. If there is a reasonable correspondence then this bodes well for the effectiveness of self-regulation as a strategy for minimizing crash risk with respect to hazard perception. If there is little correspondence then self-regulation could be, at best, an extremely inefficient strategy to maintain safe driving. To answer this question, we will examine the relationships between (1) the performance of older drivers on a validated hazard perception test, (2) their level of confidence in their performance on the hazard perception test, and (3) their self-reported preferences and regulatory behaviour in real world driving.

Given that, for other measures of driving performance, there appears to be no relationship (Marottoli and Richardson, 1998) between older drivers' self-ratings of performance and their actual driving performance (consistent with a lack of insight into driving ability), we might also predict that self-ratings of performance in a hazard perception task would bear no resemblance to objectively measured performance. For example, Ackerman et al. (2010a) found that older drivers' self-rated driving ability was associated with general self-efficacy and not with functional performance in visual, physical, and cognitive assessments. However, some researchers (Ackerman et al., 2002) have proposed that participants' self-assessment accuracy improves when the ability they are rating is defined in more specific terms and hence it is possible that a stronger relationship might be obtained if the confidence measure was directly related to test performance and occurred directly after the test.

We used a correlational approach to analyse the confidence ratings (Ackerman et al., 2002) in order to avoid issues relating to scaling (the confidence judgement necessarily used a different scale to the hazard perception test scores). We hypothesized that if participants had insight into their test performance, then actual test scores should correlate with test confidence judgements. Such insight could be gained if, for example, participants realized that they were noticing some hazards inappropriately late (either in the test or in real driving). If this is the case then we also might expect age-related declines in hazard perception response times to be reflected in test confidence judgements. Furthermore, if participants used any performance insight to moderate their driving behaviour, then we might expect test confidence judgements to predict self-regulation of driving (assuming participants believed test scores reflected their driving ability to some degree).

Independent of whether drivers considered the hazard perception test to be a valid measure of their driving ability, we still might predict that drivers' self-ratings of overall driving ability and crash likelihood would predict self-reported regulation of driving if their self-regulatory behaviour was being driven by self-beliefs about driving efficacy (consistent with the Multifactorial Model for Enabling Driving Safety, Anstey et al., 2005).

Finally, if drivers do indeed have some insight into their own level of overall driving skill and they considered hazard perception to be a key aspect of their overall driving skill, then we might predict that self-ratings of overall driving skill would correlate with objective hazard perception test scores.

2. Methods

2.1. Participants

Two thousand and seven adults aged 65 years and over were randomly selected from the local electoral roll and invited to take part in the study. We obtained usable data from 307 of the drivers who volunteered to take part (response rate 11.38%). The mean age of this sample was 74.76 years (*SD* 6.92, range 65–96). They had an average of 52.91 years driving experience (*SD* 8.42, range 12–75), and drove an average of 192.21 km per week (*SD* 142.82, range 10–1000). 69.6% reported driving every day, and 32.5% were women. Other attributes of the sample can be seen in Table 2.

To provide a comparison of how this sample might differ from the population, we inspected the 2006 Australian census (www.abs.gov.au), both locally (Australian Central Territory) and nationally (Australia). There were a higher proportion of males in our sample than in the population (55.37% female locally; 55.15% female nationally). However the average age of adults aged 65 and over was very similar (in the census, the mean age was 74.63 locally and 75.08 years nationally). Locally, 47.34% of adults aged 65 and over reported a University-level qualification in the census. The national figure was 24.86%. In our sample, 39.4% reported 2 or more years of university education (2 years being the minimum required to obtain a university qualification), suggesting that our sample was broadly representative of the local population in terms of education but that they were more highly educated than the national population.

We can confirm that the study had ethical approval, that participants gave informed consent to take part, and that they were not paid for participation.

2.2. Materials

2.2.1. ACT Hazard Perception Test

A shortened (22 item; 15 min) version of a previously validated video-based hazard perception test (Wetton et al., 2010) was used. Participants watched video clips of genuine traffic scenes filmed from a driver's point-of-view on a 32 in. LCD touch screen, which contained incidents (described as "traffic conflicts") in which the camera car might have had to brake or take evasive action to avoid a crash or near-miss with other road users (pedestrians, cyclists, or stationery or moving vehicles). Participants were asked to touch any road user that could be involved in a traffic conflict with the camera car as quickly as possible. Traffic conflicts were chosen to