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Cognitive function and young drivers: The relationship between driving, attitudes, personality and cognition



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ABSTRACT

Young drivers (aged 17–25 years) are the highest risk age group for driving crashes and are over-represented in car crash statistics in Australia. A relationship between cognitive functioning and driving in older drivers (60 years and older) has been consistently supported in previous literature, however, this relationship has been neglected in research regarding younger drivers. The role of cognitive functioning in young people's driving was investigated both independently and within a current model of younger peoples driving performance. With young drivers as participants, driving behaviour, attitudes, personality and cognitive functioning were tested and driving performance was operationalised through two measures on a driving simulator, speeding and lane deviations. Cognitive functioning was found to contribute to driving behaviour, along with driving attitudes and personality traits, in accounting for young people's driving performance. The young drivers who performed better on cognitive functioning tasks engaged in less speeding behaviour and less lane deviation on the driving simulator than those who performed worse on these tasks. This result was found independent of the role of driving behaviour, driving attitudes and personality traits, accounting for unique variance in driving ability.

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1. Introduction

In Australia, the young driver age group (17–25 years old) is over-represented in motor vehicle crash statistics, with young drivers representing 22–26% of all fatalities on Australian roads, but only 10–15% of the driving community (Prendergast, 2012). These crashes result in large community costs and based off crash and health care data from between 2005 and 2013, it has been estimated the total lifetime care costs of young drivers injured and killed in Victoria was \$634 million (Buckis, Lenné, & Fitzharris, 2015). Similar proportional cost estimates are expected for the other states in Australia, resulting in a large economic burden to the nation. As well as financial burden, the loss of young lives on Australian roads is devastating and therefore efforts to reduce the fatality rate are important.

1.1. Why do young drivers crash?

A widely-researched area of social-cognitive driving research is *what* influences risky driving behaviour. Parker, West, Stradling, and Manstead (1995) have identified three forms of risky behaviour while driving, two unintentional behaviours

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(lapses and errors), and one intentional contravention of safe driving laws (violations). The tendency to commit violations is associated with high car crash risk, with a positive linear trend between the number of violations and degree of crash involvement (Parker, Reason, Manstead, & Stradling, 1995). There is a strong negative relationship between age and frequency of violations committed (Parker, Reason, et al., 1995), as young drivers have significantly more road rule violations than their older counterparts (Kweon & Kockelman, 2003; Williams & Shabanovab, 2003). It has been suggested that this propensity to commit road violations and engage in risky driving behaviour by young people is influenced both by careless attitudes towards traffic safety and various personality traits.

Attitudes: Risk-taking behaviour in traffic can be linked to casual attitudes towards the consequences of road rule violations and unsafe behaviours. Iversen (2004) surveyed young drivers in Norway, concluding that favourable attitudes towards rule violations and speeding, towards the careless driving of others, and towards drinking and driving, were all associated with more self-reported risk-taking behaviours in traffic. Similarly, Hassan and Abdel-Aty (2013) found positive attitudes towards speeding significantly predicted at-fault crashes in young drivers. Mirzaei et al. (2014) found a one standard deviation increase in safe attitudes resulted in a 26.4% decrease in crashes with young drivers, with attitudes the single best predictor of crash involvement. Taken together, the above results suggest that favourable attitudes towards rule breaking and unsafe behaviour have been shown to predict poor driving outcomes and high-risk driving behaviour in young individuals.

Personality: The role of personality traits in influencing younger drivers has been the most heavily researched area appraising increased crash risk in this age group. Previous literature suggests that during adolescence and young adulthood, risky driving is a pathway to expression of independence, authority defiance and peer acceptance, reflecting deliberate participation in a high-risk lifestyle (Jonah, 1986; Ulleberg, 2001). While acknowledging that previous literature has supported numerous personality traits' as influencing young people's driving behaviour, the personality traits with the most support in the driving literature were included in this study; sensation seeking, anxiety and anger.

Sensation seeking has been defined as the desire to seek out novel experiences with social and physical risk for excitement (Deery, 1999; Zuckerman, 2007). In an Australian sample, young drivers high in sensation seeking tendencies had a lower aversion to risk taking and were more likely to speed (Machin & Sankey, 2008). Concordantly, Cestac, Paran, and Delhomme (2011) found sensation seeking was related to speeding in a group of young novice drivers.

Secondly, trait anxiety and driving is a strongly supported relationship in previous research on young drivers. Within the literature investigating the role of anxiety on driving performance, two alternatives have been proposed as to how trait anxiety impacts driving performance in young people. Starkey and Isler (2016) found that adolescents who scored high on a neuroticism/anxiety measure were more likely to engage in risky behaviours. However, Ulleberg and Rundmo (2003) found evidence that those with low anxiety scores were more likely to self-perceive their risk of crashing as low, have a negative attitude towards traffic safety and self-report more risk-taking behaviours in traffic than their high anxiety counterparts. This suggests that while an average level of anxiety may not impact driving performance, extremely high or low levels of anxiety could negatively affect driving performance.

Finally, previous literature investigating young drivers provides overwhelming support for the role of anger in risky driving behaviour (Oltedal & Rundmo, 2006; Schwebel, Severson, Ball, & Rizzo, 2006). Deery and Fildes (1999) conducted a study on 198 novice drivers, and found both high risk driving groups were high in driving anger, hostility, irritability, competitive speed and driving to reduce tension. High anger levels were also evident in the investigation by Arnett, Offer, and Fine (1997), with the authors finding that those high in either trait or state anger engaged in more reckless driving behaviour. In their sample, the adolescents scored significantly higher than adults on anger and reckless driving. As a result of the consistently strong relationships between young drivers and sensation seeking, anxiety and anger evidenced above, these will be investigated in the current study. From here out, sensation seeking, anxiety and anger will be collectively referred to as personality variables.

Attempting to integrate social-cognitive and personality factors in accounting for risky driving in young people, Ulleberg and Rundmo (2003) developed a model of driving in younger drivers. The model proposes that while the attitudes aspects of the model have direct effects on risky driving behaviour, personality traits indirectly affect risky driving through influencing risk perception and attitudes towards traffic safety. While Ulleberg and Rundmo's (2003) model has effectively accounted for many risky driving behaviours in young drivers, there are other variables not encompassed in this model that have been shown to be important to driving performance, namely cognition.

1.2. Cognition and driving

In previous literature, there is a clearly established relationship between cognitive functioning and driving ability. Research has consistently shown that older individuals with cognitive decline and those with cognitive impairment exhibit significantly poorer driving performance than other drivers (Aksan, Anderson, Dawson, Uc, & Rizzo, 2015; Alosco, Spitznagel, Cleveland, & Gunstad, 2013; Aslaksen, Ørbo, Elvestad, Schäfer, & Anke, 2013; Bennett, Chekaluk, & Batchelor, 2016; McKnight & McKnight, 1999; Reger et al., 2004). Importantly, Ledger, Bennett, and Chekaluk (2016) conducted a study investigating the role of cognitive functioning in accounting for the driving ability of those in both an older age group (65 years and older) and younger drivers age group (18–25 years old). These authors tested participants on both cognitive functioning assessments and a driving simulator, finding that cognitive functioning was significantly, positively related to driving in both older and younger individuals. Furthermore, they found that the strength of the relationships between the various cognitive domains and driving performance in the two groups did not differ from one another. Given that, in Australia, the youngest

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