A further exploration of sensation seeking propensity, reward sensitivity, depression, anxiety, and the risky behaviour of young novice drivers in a structural equation model

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ABSTRACT

Young novice drivers constitute a major public health concern due to the number of crashes in which they are involved, and the resultant injuries and fatalities. Previous research suggests psychological traits (reward sensitivity, sensation seeking propensity), and psychological states (anxiety, depression) influence their risky behaviour. The relationships between gender, anxiety, depression, reward sensitivity, sensation seeking propensity and risky driving are explored. Participants (390 intermediate drivers, 17–25 years) completed two online surveys at a six month interval. Surveys comprised sociodemographics, Brief Sensation Seeking Scale, Kessler's Psychological Distress Scale, an abridged Sensitivity to Reward Questionnaire, and risky driving behaviour was measured by the Behaviour of Young Novice Drivers Scale. Structural equation modelling revealed anxiety, reward sensitivity and sensation seeking propensity predicted risky driving. Gender was a moderator, with only reward sensitivity predicting risky driving for males. Future interventions which consider the role of rewards, sensation seeking, and mental health may contribute to improved road safety for younger and older road users alike.

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1. Introduction

1.1. The young novice driver

Novice drivers in motorised countries are typically the youngest drivers, and they have a disproportionately high rate of involvement in road crashes. This phenomenon has persisted throughout Australia even in the context of steadily reducing crash rates for all drivers. To illustrate, Australian road fatalities among drivers aged 17–25 years represented 11.4 deaths per 100,000 population in 1990. This almost halved to 6.3 deaths per 100,000 population in 2009. In contrast, older drivers aged 40–59 years contributed 4.1 deaths per 100,000 population in 1990, reducing to 3.5 deaths per 100,000 population in 2009 (DITRDLG, 2010). Notwithstanding these improvements, persons aged 17–24 years comprised 13.0% of the licensed driving population in Queensland, Australia, in 2010;

however, they represented 23.0% of the state's road toll (DTMR, 2011).

Young novices also place themselves at risk through their driving behaviour, including driving at night, driving on the weekend (Doherty et al., 1998), and exceeding speed limits (Yannis et al., 2007). A range of young novice driver attributes increases their risk of injury or death from a road crash. These include physiological characteristics (e.g. an underdeveloped brain; Steinberg, 2008); an underestimation of risks (Weinstein, 1980); and underdeveloped hazard perception skills (Lee et al., 2008). Young novices also have increased sensation seeking propensity (Jonah, 1997), and their driving behaviour is vulnerable to the influences of their friends and their parents (Scott-Parker et al., 2009, 2012a). Of interest to the current research is the influence of the psychological states and traits of young novice drivers, specifically the increased risky driving associated with psychological distress, sensation seeking propensity and reward sensitivity (Scott-Parker et al., 2012b).

1.2. The psychosocial characteristics of the young novice driver

To better understand the risky behaviour which contributes to the crash involvement and offences of young novice drivers, road safety researchers have begun to consider the nature and breadth of psychosocial characteristics including their personality traits.

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Risky behaviour is associated with the psychological distress of the young novice driver; with greater anxiety and depression being associated with more self-reported risky driving (Scott-Parker et al., 2011). Depression can also predict future drink driving in repeat-drink-driving offenders (Hubicka et al., 2010). Risky behaviour has been associated with sensation seeking propensity; greater sensation seeking propensity corresponding to more self-reported risky driving (e.g., Jonah, 1997; Scott-Parker et al., 2009). Anxiety has also been associated with sensation seeking propensity and risky driving (Oltedal and Rundmo, 2006). Moreover, risky behaviour has also been associated with sensitivity to reward and sensitivity to punishment; greater reward sensitivity corresponding to more hazardous drinking (Loxton and Dawe, 2006) and self-reported risky driving (Scott-Parker et al., 2012b); and individuals with greater sensitivity to reward and less sensitivity to punishment more likely to report marijuana use (Simons and Arens, 2007).

Scott-Parker et al. (2012b) first recognised the potential mediating relationships amongst the psychological states of anxiety and depression, and the trait of punishment sensitivity; and amongst the psychological traits of reward sensitivity and sensation seeking propensity. To illustrate, anxiety and depression have high comorbidity and are particularly prevalent during the adolescent period. Simulator-based research revealed that drivers with greater anxiety drive more cautiously (Stephens and Groeger, 2009), and individuals reporting more marijuana use also exhibit less sensitivity to punishment (Simons and Arens, 2007). Therefore the Authors suspected a mediation relationship amongst these traits and states. Similarly, the literature consistently reports more risky behaviour is performed by those individuals with greater sensation seeking propensity and reward sensitivity, suggesting that the two constructs may be measuring the same construct, and accordingly the Authors suspected a mediation relationship amongst these traits.

Scott-Parker et al. (2012b) explored the potential mediation relationships in greater detail using the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) (Torrubia et al., 2001), Kessler's Psychological Distress Scale (K10) (Kessler and Mroczek, 1994, cited in Andrews and Slade, 2001), the Impulsive Sensation Seeking Scale (ISSS) (Zuckerman et al., 1993), and the Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010). This was the first exploration of these mediating relationships, and the following relationships were found: sensitivity to punishment was found to be mediated by depression and anxiety; and reward sensitivity and sensation seeking propensity were found to be separate, yet related, constructs.

Accordingly a full path model which incorporated the co-varying depression and anxiety, and the co-varying reward sensitivity and sensation seeking propensity, was used to predict the self-reported risky behaviour of the young novice driver. Depression, reward sensitivity, sensation seeking propensity and anxiety explained a significant 24% of variance in the self-reported risky driving by the young novice driver. The important role of driver gender was also recognised in this research, and moderation analyses using the simplest approach of replicating the path model for each gender found that gender was a moderator: whilst depression, reward sensitivity, and sensation seeking propensity were influential for males, anxiety was also influential for females. Reward sensitivity was twice as influential for females as for males, whilst depression was twice as relevant for males as for females. Sensation seeking propensity exerted a similar influence for both genders. The path models explained 21% and 27% of variance in the risky driving behaviour of young male and female novice drivers, respectively.

The research of Scott-Parker et al. (2012b) was cross-sectional in nature, however. Considering the pervasive influence of the psychological traits/states of reward sensitivity, sensation seeking propensity, depression, and anxiety, longitudinal research is required to more fully understand their influence on self-reported risky driving. In addition, the stability of these constructs in the adolescent young novice driver merits further exploration.

1.3. Study aims

This study explores the self-reported risky driving behaviour of the young novice within the context of their reward sensitivity, sensation seeking propensity, depression, and anxiety in a longitudinal methodology. Previous research revealed the influence of these constructs is moderated by gender, and developmental considerations may be a factor. Accordingly a structural equation model based upon the research findings of Scott-Parker et al. (2012b) incorporating two sequential measures of reward sensitivity, sensation seeking propensity, depression, and anxiety is tested. Separate tests are conducted for each gender. The stability of reward sensitivity, sensation seeking propensity, depression, and anxiety is also examined, including separate gender analyses. Understanding the relationships between reward sensitivity, sensation seeking propensity, depression, and anxiety may reveal additional avenues for intervention in road safety, and in particular the longitudinal investigation may provide heretofore unrealised insights into the development and operationalisation of these constructs. The research does not, however, examine why the novice who is depressed and/or anxious drives in a different manner.

2. Method

2.1. Participants

Drivers ($n = 1170$, 461 males) aged 17–25 years ($M = 17.90$, $SD = 1.51$, Mode, Median = 17) volunteered to complete the 30 min Learner Survey (Survey 1). Six months later, 390 of these novice drivers (113 males) aged 17–25 years ($M = 18.23$, $SD = 1.58$, Mode = 17, Median = 18) completed the 30 min Provisional Survey (Survey 2). The analyses were conducted using the responses of these 390 participants only. The sample size exceeded the ratio of 20 participants to each variable required for structural equation modelling (Kline, 2011).

2.2. Measures

Participants reported age and gender, completed the binary 11-item abridged Sensitivity to Reward Questionnaire[1] (SRQ) (yes, no) (Time 1: skewness = .50, kurtosis = −.28; Time 2: skewness = .53, kurtosis = −.28), and responded to the 5-point Likert scales of the K10 (1 none of the time to 5 all of the time) which was subsequently divided into depression (K10-depression; Time 1: skewness = 1.34, kurtosis = −2.04; Time 2: skewness = 1.37, kurtosis = 1.69) and anxiety (K10-anxiety; Time 1: skewness = 1.20, kurtosis = 1.89; Time 2: skewness = 1.03, kurtosis = .74) subscales, and the 8-item Brief Sensation Seeking Scale (BSSS)[2] (Hoyle et al., 2002) (1 strongly disagree to 5 strongly agree) (Time 1: skewness = .02, kurtosis = −.40;

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[1] In the interests of brevity and to address psychometric problems such as low factor loadings (e.g., Li et al., 2007) identified in applications of the SPSRQ, preliminary research refined an abridged version of the Sensitivity to Reward Questionnaire. Three separate exploratory factor analyses which retained only items loading above .40 for all three groups were conducted: the total sample, the male participants only, and the female participants only. The participants were 476 drivers (238 males) aged 17–25 years ($M = 19.0$, $SD = 1.59$) with a Provisional licence who attended 1 of the 13 major tertiary institutions across Queensland; matched for age, gender and tertiary institution. The Abridged SRQ correlated very highly with the original SRQ ($r = .90$).

[2] In the preliminary research, the predictive ability of the BSSS and the ISSS were also compared through hierarchical multiple regressions which alternated the steps in which each scale was entered into the equations. In the interests of brevity, and