

## Factors Influencing Young Drivers' Risk Perceptions and Speeding Behaviour

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### ABSTRACT

Research focusing on young novice drivers' risk perceptions has shown that inexperienced drivers underestimate the risks associated with a range of driving situations. Personality factors are an important influence on both risk perceptions and driving behaviour. The study investigated the strength of relationship between specific personality factors, risk perceptions, and speeding behaviour among young, mainly inexperienced drivers. One-hundred and fifty-nine students aged between 17 and 20 completed an online questionnaire assessing five facets of personality, four components of risk perception, and a self-report measure of speeding behaviour. Using structural equation modeling, 39% of the variance in young drivers' speeding was accounted for by excitement-seeking, altruism, their aversion to risk taking, and their own likelihood of having a crash. The influences of excitement-seeking and altruism are partly mediated by their aversion to risk taking, while the influence of altruism on speeding is also partly mediated by their own likelihood of having a crash. Further consideration should be given to road safety interventions that strengthen young drivers' appreciation of the impact of their actions on others through positive reinforcement of altruistic norms.

### INTRODUCTION

In Australia, young, inexperienced drivers are a small percentage of licensed drivers and yet, these drivers make up a much larger percentage of those experiencing traffic crashes and injuries (Senserrick & Haworth, 2004). It seems that young drivers' involvement in risky driving behaviour such as speeding is a major contributing factor to a higher rate of crashes and injuries (Smart & Vassallo, 2005; West & Hall, 1997). The focus of this study is the individual difference variables that contribute to greater involvement in speeding and these include factors associated with risk perception and aspects of drivers' personality.

#### *Risky Driving and Speeding*

Speeding is a risky driving behaviour that has been studied by many researchers (Begg & Langley, 2004; Lam, 2003). Excessive driving speed is considered one of the most important contributors to road crashes, regardless of driver age and level of skill (Elliott, Armitage, & Baughan, 2004). Even when aware of the potential consequences of speeding, drivers in Australia still indicate involvement in speeding behaviour (Brown & Cotton, 2003). Clarke, Ward and Truman (2002) also suggested that speed was the most common factor involved in driving offences among young drivers. West and Hall (1997) found that speed was a significant contributor to specific kinds of crashes (that is, active accidents) along with both (poor) attitudes towards driving and social deviance. McKenna and Horswill (2006) suggested that involvement in speeding behaviour may also be due to a low probability of negative outcome. For example, individuals may consider involvement in a crash as less likely than being caught by the police.

### *Risk Perception and Speeding*

In relation to driving behaviour, risk perception refers to, “the subjective experience of risk in potential traffic hazards” (Deery, 1999, p. 226). Therefore, risk perception is considered a proximal indicator of driving behaviour. Many researchers have indicated that risk perception is negatively related to risk behaviour in general (Cohn, Macfarlane, Yanez, & Imai, 1995). That is, a higher level of perceived risk for a particular behaviour is associated a lower chance that an individual would take part in that behaviour.

Rundmo and Iversen (2004) suggested that most research has emphasised a cognitive, or belief-based component of risk perception, which focuses on the way young drivers perceive and process information (Brown & Cotton, 2003; Grayson & Elliott, 2004). However, when measuring perceived risk, Rundmo and Iversen considered it was important to distinguish between cognitive-based and affective-based subjective assessments. Affective components of risk perception such as worry and concern have also been found to be a predictor of risky driving behaviour (see Rundmo & Iversen; Ulleberg & Rundmo, 2003). However, McKenna and Horswill (2006) found that worry and concern appeared to have less influence than other variables (e.g., legal constraints, mood, passengers, journey time, economics, and thrill), and accounted for only 2% of the variance in both speeding and driving violations.

Therefore, in the present study, the combined worry and concern items from Rundmo and Iversen (2004) were used as a predictor of speeding along with a number of other scales that focused on the cognitive subjective judgements such as perceived likelihood of being involved in a crash, driving efficacy, and aversion to risk taking.

### *Personality and Speeding*

Previous research has also indicated that personality variables, including anxiety, anger, excitement-seeking, altruism, and normlessness are direct contributors to involvement in risky driving behaviour (Smart & Vassallo, 2005; Ulleberg & Rundmo, 2003). Significant indirect effects have also been found for personality in relation to driving behaviour (Rundmo & Iversen, 2004; Ulleberg & Rundmo) which is consistent with personality variables acting as distal influences on driving behaviour.

An Australian study of young adults' driving behaviour undertaken by Smart and Vassallo (2005) utilised longitudinal data of the psychosocial development of young people from infancy to early adulthood. The results of the study indicated that high levels of anti-social behaviour and aggression, and low levels of empathy were precursors to young drivers' involvement in risky driving and speeding violations. Low levels of anxiety were also associated with involvement in speeding violations. This research found differences between those who engaged in high and low levels of risky driving and speeding behaviour were evident by early adolescence (12 to 14 years of age).

Using cluster analysis, Ulleberg (2002) found two high risk groups of young novice drivers who indicated high levels of self-enhancing, speeding, and rule violation behaviour. The first group included drivers who indicated low levels of altruism and anxiety, and high levels of sensation-seeking, normlessness, and driving-related aggression. These drivers also perceived the risk of being injured in a traffic crash as low and indicated high levels of confidence in their own skill as drivers. The second group included drivers who indicated high levels of sensation-seeking, aggression, anxiety, and driving anger. This group perceived the risk of being injured in a traffic crash as high and indicated low levels of confidence in their own skill as drivers.

The same personality variables used by Ulleberg and Rundmo (2003) were employed as predictors of speeding in the present research. Scales assessing anxiety, anger, excitement-seeking, altruism, and normlessness were included.

### *Aims*

The present study explored the combined effects of specific risk perception variables and specific personality variables on the speeding behaviour of young drivers. Specific variables were studied to provide more targeted information for the development of driving interventions. Personality variables and risk perception variables were expected to directly influence speeding behaviour while the risk perception variables may help to explain how the personality variables influence speeding behaviour.

## METHOD

### *Participants*

A total of 159 participants completed the online survey with 17 (11%) aged 17 years, 42 (26 %) aged 18 years, 46 (29%) aged 19 years, and 53 (33 %) aged 20 years. Forty-six (29%) participants were male, and 112 (70 %) were female. The sample was drawn from all faculties of the University of Southern Queensland (USQ) student population.

### *Measures*

An 80-item, cross-sectional online survey instrument, named the Road Safety Behaviour (RSB) Survey, was developed to examine personality and risk perception factors that may influence risky driving behaviour among young drivers aged between 17 and 20 years.

### *Demographics.*

The demographic section of the survey consisted of seven items that requested information related to gender, age (in yearly increments of 17, 18, 19, and 20), level of licence (e.g., What level of licence do you currently hold?), driving instruction (e.g., Who taught you how to drive?), car ownership (e.g., Who does the car you most often drive belong to?), and frequency of driving (e.g., How often do you drive?).

### *Personality scales.*

The personality measures consisted of five scales related to personality variables considered in prior research to be predictors of driving behaviour. These factors included anxiety, anger, excitement-seeking, altruism and normlessness (Ulleberg & Rundmo, 2003). Four of the scales; anxiety, anger, excitement-seeking and altruism, were selected from the International Personality Item Pool (IPIP; Goldberg, 1999). The IPIP provides freely available measures of the NEO PI-R constructs in the public domain (see <http://ipip.ori.org>). The correlations between the IPIP scales and the equivalent NEO-PI-R facet scales among an adult community sample were between .67 and .76. When the scales were corrected for measurement error, the correlations were between .90 and .95 (Goldberg). Goldberg reported Cronbach's alpha coefficients for Anxiety ( $\alpha = .83$ ), Anger ( $\alpha = .88$ ), Excitement-Seeking ( $\alpha = .78$ ), and Altruism ( $\alpha = .73$ ) among the adult community sample. At the generally accepted level ( $\alpha \geq .70$ ), the internal consistency of the scales was acceptable (Steiner, 2003).

The Normlessness variable was measured with the four item Normlessness scale which was also used by Ulleberg and Rundmo (2003). The internal consistency of the Normlessness scale ( $\alpha = .71$ ) was above the acceptable level (Steiner, 2003).

*Risk perception scales.*

The risk perception scales consisted of an affect-based Worry and Concern scale (Rundmo & Iversen, 2004), and three cognition-based scales developed by Dorn and Machin (2004). The Worry and Concern scale contained six items related to worry and concern about traffic injury and risk (e.g., To what extent are you feeling unsafe that you yourself could be injured in a traffic accident?). Rundmo and Iversen obtained Cronbach's alpha coefficients for the individual worry scale ( $\alpha = .89$ ), and the concern scale ( $\alpha = .81$ ) for a Norwegian adolescent (18 to 24 years of age) sample. The internal consistency of the affect-based risk perception scales was acceptable (Steiner, 2003).

The cognition-based scales included Likelihood of a Crash (for self and others), Efficacy (perceived confidence about driving in certain conditions) and Aversion to Risk Taking (perceived danger of certain actions while driving) from the Learner Driving Experience Questionnaire, developed by Dorn and Machin (2004).

The Likelihood of a Crash scale was scored on a 10-point rating scale. Respondents were asked to indicate the likelihood of a crash for both self and others (e.g., Please rate your chances of having an accident within the next 12 months), in 10 % increments ranging from 1 = 0 to 10% (*no chance*), to 10 = 90 to 100% (*extremely high*).

The Efficacy and Aversion to Risk Taking scale items were scored on a 5-point rating scale, ranging from 1 (*not at all*) to 5 (*extremely*). The five Efficacy items measured the extent of respondent confidence about driving in certain conditions (e.g., How confident are you about driving on unfamiliar roads?). Higher scores on the scale indicated a higher level of perceived confidence about driving in certain conditions.

The eight Aversion to Risk Taking items measured how dangerous respondents thought certain actions were while driving (e.g., Running a red light). These items did not ask drivers whether they actually performed any of these behaviours, and therefore the measure was focused on drivers' cognitions rather than their behaviour. Higher scores on the scale indicated a higher level of perceived danger for certain actions while driving. The Cronbach alpha coefficient for a shorter (six item) version of this scale used by Machin and De Souza (2004) was .74.

*Speeding behaviour scale.*

Speeding was measured using a self-report scale developed by Ulleberg and Rundmo (2003). The six item Speeding scale measured how often respondents engaged in various speeding behaviours (e.g., I overtake the car in front when it is driving at the speed limit). The obtained Cronbach's alpha coefficient was .86 which was acceptable (Steiner, 2003).

*Procedure*

Undergraduate USQ students, aged between 17 and 20 years, were recruited across faculties by email, brochure, and personal contact. With each form of contact students were provided information about the research, including a brief explanation of the purpose of the research, incentives offered, how to participate, and anonymity and confidentiality assurances. These procedures were approved by the Human Ethics Research Committee at USQ.

## RESULTS

Table 1 contains the means, standard deviations, Cronbach Alpha values and intercorrelations among the variables.

Speeding was correlated with three of the risk perception variables ( $r = .25, p < .01$  with Likelihood of a Crash,  $r = .22, p < .01$  with Efficacy, and  $r = -.49, p < .01$  with Aversion to Risk Taking) and four of the personality variables ( $r = .32, p < .01$  with Anger,  $r = .33, p < .01$  with Excitement-Seeking,  $r = -.37, p < .01$  with Altruism, and  $r = .34, p < .01$  with Normlessness).

### *Structural Equation Modelling*

As noted above, three of the risk perception variables and four of the personality variables were correlated with Speeding. A structural equation model in which all four personality variables were used as predictors and all three risk perception variables were included as mediator variables would be a fairly complex model. The initial analyses examined which of the predictors could be omitted by using hierarchical regression to test which of the predictors explained significant unique variance in Speeding. The simplified structural equation model focused on just four of the variables associated with Speeding rather than including all of the personality and risk perception variables. The variance explained by this simplified model was 39% compared to 42% in the complete model which was judged to be only a small reduction in predictive power. This model was specified with Excitement-Seeking and Altruism directly predicting Speeding, Likelihood of a Crash, and Aversion to Risk Taking, while Likelihood of a Crash and Aversion to Risk Taking also were also specified as direct predictors of Speeding (and therefore as mediators). This model was tested using Amos 6.0 (Arbuckle, 2005) and the fit statistics for this model indicated that it was a good fit to the data,  $\chi^2 = .11, df = 2, p = .95, CFI = 1.00, TLI = 1.15, RMSEA = .00$ . The results for this model are presented in Figure 1. The standardised regression coefficients for all paths are shown, although one of the paths (from Excitement-Seeking to Likelihood of a Crash) was not significant.

Inspection of the standardised total effects showed that the direct and indirect effects of Altruism (-.38) and Excitement-Seeking (.34) were comparable to the direct effects of Aversion to Risk Taking (-.37), and outweighed the direct effects of Likelihood of a Crash (.16). Therefore, the effects of Altruism and Excitement-Seeking on Speeding were partially mediated by the risk perception variables, particularly Aversion to Risk Taking.

*Table 1*  
Mean, Standard Deviation, Coefficient Alpha Statistics, and Intercorrelations among Driving Behaviour, Risk Perception and Personality Variables of the Road Safety Behaviour Survey (N = 155)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Speeding	11.79	4.47	.82									
2. Worry & Concern	16.05	4.46	-.11	.88								
3. Likelihood of a Crash	3.20	1.79	.25**	.29**	-							
4. Efficacy	16.72	3.91	.22**	-.28**	-.21**	.88						
5. Aversion to Risk Taking	28.28	4.84	-.49**	.29**	-.07	-.19*	.79					
6. Anxiety	27.51	6.81	.11	.23**	.25**	-.18*	-.01	.85				
7. Anger	22.64	6.41	.32**	.09	.26**	-.08	-.11	.60**	.88			
8. Excitement-Seeking	32.59	6.98	.33**	-.15	.03	.25**	-.37**	-.25**	-.03	.84		
9. Altruism	36.57	4.84	-.37**	.04	-.20*	.01	.17*	-.19*	-.48**	.02	.84	
10. Normlessness	7.23	2.79	.34**	-.16*	.02	.19*	-.35**	.09	.25**	.44**	-.30**	.78

*Note.* All items on each measure scored on a 5 point scale except the Likelihood of a Crash item which used a 10 point scale. Cronbach Alphas are on the diagonal. \*  $p < .05$ , \*\*  $p < .01$ .

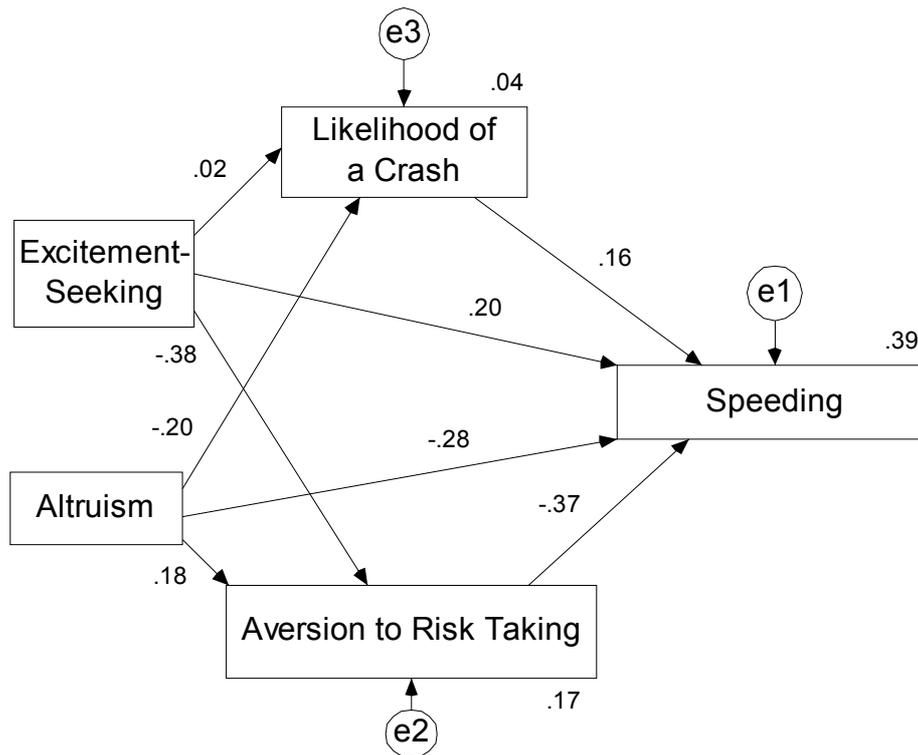


Figure 1. Predicting Speeding from Excitement-Seeking, Altruism, Likelihood of a Crash and Aversion to Risk Taking ( $n = 155$ ).

## DISCUSSION

The aims of the study were twofold: firstly, to examine the combined effects of specific personality variables (Anxiety, Anger, Excitement-Seeking, Altruism, and Normlessness) and specific risk perception variables (Worry and Concern, Likelihood of a Crash, Efficacy, and Aversion to Risk Taking) on Speeding, and secondly, to determine whether the risk perception variables mediated the effects of personality variables on driving behaviour. We reduced the set of predictor variables to focus on just two of the personality variables and two of the risk perception variables. The overall percentage of variance explained in the simplified path model was 39%. The structural equation model was a good fit to the data and the total effects (both direct and indirect) of the four predictors enabled the relative importance of the predictor variables to be compared. A detailed explanation of the results will follow.

A structural equation model was specified which shows that Excitement-Seeking was a significant predictor of Aversion to Risk Taking and Speeding, and that Altruism was a significant predictor of Likelihood of a Crash, Aversion to Risk Taking, and Speeding. The total effects of the two personality variables on Speeding were -.38 for Altruism and .34 for Excitement-Seeking, while the total effects for the two risk perception variables were -.37 for Aversion to Risk Taking, and .16 for Likelihood of a Crash. We can conclude that the two personality variables were of equal importance to the participants' Aversion to Risk Taking in influencing speeding behaviour and that Aversion to Risk Taking partially mediated the effects of the personality variables on Speeding.

Previous research has shown that young, inexperienced drivers who tended to be involved in higher levels of speeding during their driving also underestimated the potential risk of driving situations, and overestimated their level of skill as drivers (Deery, 1999; Gregersen, 1996; McKenna & Horswill, 2006).

We have shown that, in addition to being inexperienced, young drivers with higher levels of excitement-seeking, lower levels of altruism, greater perceived likelihood of a crash, and a lower aversion to risk taking are also more likely to report greater speeding. Smart and Vassallo (2005) reported that the young adolescents (12-14 years) who later reported greater speeding behaviour were also more antisocial. Greater speeding was also associated with greater aggression as well as being more antisocial when data from mid-to-late adolescence (15-18 years) was compared. In early adulthood (19-20 years), the factors that differentiated between those who reported more speeding were their level of antisocial behaviour, and their amount of contact with the criminal justice system. There was also a marked gender difference with a greater proportion of young males in the groups reporting the most speeding violations. The variable in the current study which is most closely related to antisocial behaviour is Altruism which is a concern for the welfare of others (i.e., prosocial behaviour).

To a lesser extent, Likelihood of a Crash was also a positive predictor of Speeding behaviour. However, it is quite possible that Likelihood of a Crash is also a consequence of Speeding. The significant regression coefficient does not establish causality and drivers who speed more may also recognise that there is a greater risk of having a crash.

The other significant influence on Speeding was Excitement-Seeking. Previous research has indicated that an identical measure of Sensation-Seeking directly contributed 10% to 15% of the variance in Speeding behaviour, indicating that excitement-seekers drove faster than other drivers (Burns & Wilde, 1995). In this study, Excitement-Seeking was both a direct predictor of Speeding, as well as an indirect predictor through its influence on Aversion to Risk Taking. A greater level of Excitement-Seeking was associated with a lower Aversion to Risk Taking which in turn negatively predicted Speeding.

The important role of Altruism in this study supports Smart and Vassallo's (2005) conclusions that self-reported antisocial behaviour was one of the strongest influences on later risky driving behaviour. Other important influences were the level of involvement with peers who were antisocial as well as the level of contact with police regarding driving offences. Similar results were found for crash involvement, with the level of antisocial behaviour, contact with police over driving offences, and association with antisocial peers differentiating those who had experienced crashes from those who had not. It seems that a driver's attitudes about the social acceptability of speeding may be the strongest influence on how likely that driver is to speed.

#### *Generalisability of the Results*

As the present research limited participation to USQ students, the sample may not be representative of the population of young, 17 to 20 year old inexperienced Toowoomba drivers who do not attend university. Also, the low proportion of males (29%) may limit the applicability of these results to young male drivers. Due to the socially undesirable nature of risky driving behaviours, participants may have under-reported involvement in driving behaviours. However, the use of an online administered survey has been shown to reduce the level of socially desirable responding compared to face-to-face surveying (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Further, the option to withdraw from the research at any time, and the assurance of anonymity and confidentiality of data were provided to help reduce method bias (Podsakoff et al.). Given that the results of this study support the findings of other studies using different methodologies, it is reasonable to conclude that the online survey does not necessarily alter the relationships between the predictor variables and speeding. However, questions remain about whether an online survey influences an individual's choice about whether to participate and whether the results would generalise to the wider population of young drivers.

Another limitation with use of self-report data is that the level of reported involvement in driving behaviours indicated by participants may provide an indication of past behaviour, yet not provide an accurate indication of actual involvement in such behaviours in the future (Deery, 1999; Elliott et al., 2004). Our results need to be compared with actual numbers of driving violations and speeding infringements.

### *Implications and Application of Findings*

An understanding of the relationship between specific risk perception, personality, and driving behaviour may help target these behaviours more effectively. In particular, the mediating effect of Aversion to Risk Taking has implications for the development of driver training programs. Practical applications of the results of the present research may include a measure of drivers' tendency toward Excitement-Seeking and Altruism which could be used as a screening procedure when young drivers undertake initial driver training. Further to the initial screening procedure, self-awareness exercises may be included in driver education programs to help young drivers gain insight into how their tendency to crave excitement and the importance that they place on the welfare of other drivers, as well as the level of danger that the driver perceives in a situation, may affect their willingness to speed.

In addition, public road safety campaigns could focus on the development of interventions that strengthen young drivers' appreciation of the impact of their actions on others through positive reinforcement of altruistic norms. Ajzen's (2001) Theory of Planned Behaviour (TPB) suggests that perceived normative beliefs are an important determinant of behavioural intentions.

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