

Risk Factors Associated with Speeding Offences Among Young Western Australian Drivers

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Abstract

Aims: The over involvement of drivers aged 17-24 years in crashes and the characteristics of those crashes are well documented. Foremost among the identified characteristics is the involvement of speed. This paper investigates the effect of various driver attributes on the risk of incurring a Traffic Infringement Notice for speeding in the first 12 months of driving.

Methods: Seventeen year old newly licensed drivers (n=1277) in Perth, Western Australia, were recruited and followed over the first 12 months of driving. Various driver attributes were assessed for their effect on the likelihood of a driver receiving a Traffic Infringement Notice for speeding.

Results: At 12 months post-licensing, 27% (n=347) of the drivers had incurred a total of 476 Traffic Infringement Notices for speeding. Speeding infringements accounted for 57.5% of all infringement notices incurred in the first 12 months of licensing. Multivariate analysis indicates that the risk of incurring an infringement notice for speeding is highest for male drivers and drivers who were found to be high on measures of risk taking and driver confidence-adventurousness, and low on the practice of positive health-related behaviours.

Conclusion: The results show that gender and driver attributes of self-perception of driving style, risk taking, and lifestyle are associated with the risk of incurring a Traffic Infringement Notice for speeding in the first 12 months of driving. Further research will be undertaken to investigate the robustness of these risk factors over time.

Introduction

Within Australia and elsewhere, injury is well recognised as a major source of mortality, morbidity, and years of potential life lost among teenagers and young adults 17-24 years. Of the various sources of injury among this age group, road injury, and in particular injury to motor vehicle drivers, is a leading cause of injury (National Injury Surveillance Unit, 1995).

Approximately 32% of all motor vehicle drivers fatally injured in Australia in 1997 were aged 17-25 years. This represents an age-specific death rate of 10.2 persons per 100,000 population (Causes of Death, Australia:1997, 1999). In Western Australia for the period 1987-1996, drivers aged 17-24 years accounted for 32% of police reported driver fatalities and 36.8% of police reported hospitalisations. Yet, this age group constituted only 16.9% of all licensed motor car drivers (Palamara et al 1998). Clearly, this age group is over-represented in the driver injury statistics.

It is well known that increases in travel speeds are associated with an increased risk of a casualty crash (e.g., Kloeden and McLean 1998). Self-reported behaviour and police-issued infringement data shows that young drivers are more likely than older age drivers to speed (Forsyth et al 1995; Ryan et al 1999; Rosman 2000). This tendency for increased travel speed is reflected in young driver crash patterns. Crash data, both locally and elsewhere, show that drivers aged 17-24 years are more often involved in crashes where excessive travel speed is considered to be a contributing factor (Macdonald et al 1994; Palamara et al 1998; Ryan, et al 1999). The most recent figures for Western Australia (1999) show that speed was considered to be a contributing factor in 61% of fatal crashes involving drivers/riders aged 17-24 years, compared with 28% of fatal crashes for drivers/riders aged 25 years and older (Kirov et al 2000). The contribution of speed was found to be highest for crashes involving young males (63.5%) compared with young females (50%) (Kirov et al 2000).

Recent research demonstrating a relationship between prior speeding offences and crashes (Rosman 2000) highlights the additional need to understand and control speeding behaviour, particularly among less experienced young drivers. Like other driving behaviours, the choice of travel speed is determined by a multitude of transient and stable factors that can be grouped under the broad headings of environmental (e.g., road conditions, vehicle factors, traffic flow, policing) and individual driver factors (e.g., demographics, past experiences, personality characteristics, attitudes, identity). Speeding is a risky driving behaviour and to that end, research has predominantly focused on its association with the attributes of drivers that predispose them to risk taking.

One of the most frequently investigated personality characteristics of drivers is sensation seeking. High sensation seeking individuals are well known for their willingness to take risks to maintain an optimum level of arousal, to focus on the benefits of risk taking, and to be undeterred by threats of punishment for inappropriate behaviour (Zuckerman 1994). A substantial body of evidence indicates that drivers who score high on sensation seeking scales are predisposed to risk taking on the roads. For example, these drivers are more likely to speed and to have incurred traffic penalties for speeding, compared with drivers who are low on this trait (Jonah 1997).

Driver self-perception is also thought to play a role in risk-taking behaviour on the roads. The drivers' perception of their skill and style has been found to be associated with speeding behaviour. Those who regarded their driving as more aware, confident, skilled (eg., Adams-Guppy and Guppy 1995; Lajunen and Summala 1997) and less sociable (e.g., discourteous, aggressive to other drivers) (Adams-Guppy and Guppy 1995) were more likely to speed compared with drivers who considered themselves to be less confident, less skilful, less aware and more sociable.

Attitudinal models of risk taking assume that driver behaviour is influenced by the attitudes or beliefs drivers hold toward a specific driving behaviour. These models vary in their focus but typically cover beliefs about the likelihood of experiencing both positive and negative outcomes for the behaviour, beliefs about the social pressures to engage in or resist the behaviour, and beliefs about personal control over the behaviour. With respect to speeding, Rothengatter and Manstead (1997) and Gordon and Hunt (1998) report that driver beliefs about the outcomes of speeding behaviour (e.g., detection, punishment, and crashing) are a stronger predictor of intended speeding behaviour than beliefs about the perceived social norms for speeding. Gordon and Hunt (1998) also found that personal control over the behaviour was a significant predictor of intention to speed. In contrast, Harrison et al (1999) found that perceptions about the likelihood of being caught for speeding was unrelated to speed related choices for young drivers.

In addition to the above driver attributes, other notable associations with risky driving behaviour and in particular speeding, include male gender (Shope et al 1996; Alsop et al 1998; Begg and Langley 1998; Rosman 2000) and certain life-style factors such as use of alcohol (Beirness and Simpson 1988) and marijuana (Alsop et al 1998).

Relative to older drivers, young drivers have a tendency to speed. This disposition, coupled with their inexperience, increases their risk of crash involvement. The aim of this paper is to describe the incidence of speeding offences among 17 year old probationary drivers, and to determine the effect of various driver attributes on speeding offences in the first 12 months of driving.

Methods

A sample of probationary drivers aged 17 to 18 years was recruited from three driver licensing centres in the Perth metropolitan area (population approximately 1.3 million) between January and July 1997. Drivers in the State of Western Australia (of which Perth is the capital) are eligible for a probationary license at 17 years of age; this status of license is held for 12 months whereupon a full driver's license is obtained. To be eligible to participate in the study, drivers, at the time of recruitment, had to have successfully obtained a probationary driver's license and not have a record for a motor vehicle infringement(s), conviction(s) or involvement, as the driver, in a motor vehicle crash. Also, all drivers had to be residing in the Perth metropolitan area at the time of recruitment.

A total of 3,350 drivers were approached at the licensing centres to participate in the study. At the time of recruitment, each driver was asked to complete a questionnaire. Fifty-six drivers declined to take a questionnaire, while the remainder of the drivers either did not meet the eligibility criteria (n=3), returned the questionnaire without completing it (n=404) or failed to respond to our requests to return the questionnaire

(n=1607). The remaining 1,277 drivers who completed and returned the questionnaire made up the original cohort.

The questionnaire administered at baseline comprised 9 sections: demographic details; driving experience prior to licensing; the practical driving test and preparedness for driving; driver expectations of on-road behaviour in the first 12 months of driving; how others think you should drive; perceived outcomes of certain on-road behaviours; reaction to the expected outcomes; self-perceptions of driving style and skill; and impulsivity and sensation seeking. Socioeconomic status for drivers was based on the index of social disadvantage for Australian post-codes. Driving exposure was based on drivers' self-report at 12 months of the amount of driving undertaken during a normal week. The questionnaire took approximately 40 minutes to complete. Further details about the scales and items of the baseline questionnaire can be found in Stevenson et al (2000).

The number of Traffic Infringement Notices (TIN) issued by police for any class of speeding offence in the first 12 months of driving served as the outcome measure. This information was provided by the WA Police Service.

A description of the demographic characteristics of the cohort and their putative risk factors was undertaken. Data reduction techniques using principal axis factor analysis with oblique rotation were undertaken on the 35 item driving style and skill scale. Univariate statistics were computed and variations in proportions were assessed using the Pearson chi-square test, with continuity correction where appropriate. Comparison of the means for continuous variables was undertaken using one-way Analysis of Variance and where appropriate, independent t-tests. The effects of driver attributes (e.g., sex, life-style behaviours, pre-license driver training and experience, driver attitudes and beliefs relevant to speeding, driver style and skill factors, impulsivity and sensation seeking, driving exposure, and socioeconomic status) on the number of TIN's issued for speeding were evaluated using negative binomial regression. All *p* values were two-sided and were considered significant at 0.05.

Results

The mean age for males at first driving was significantly higher (mean=13.9 years) compared with female drivers at 15.2 years ($t=7.77$, $df=923.6$, $p=0.000$). The majority of the cohort received professional driving instruction (98%), with females taking significantly more lessons in contrast to males prior to obtaining a probationary license (12 versus 9 lessons, $t=9.22$, $df=1236$, $p=0.000$). Males reported being more confident-adventurous on the road compared with females (mean 23 versus mean 21; $t=-8.52$, $df=1261$, $p=0.000$). They were also more likely to be categorised as high on impulsivity and sensation seeking compared with females ($\chi^2 = 12.4$, $df = 2$, $p = 0.002$). Preliminary analyses of data gathered from those who chose not to participate in the study indicates no significant differences between the cohort responders and non-responders on impulsivity and sensation seeking items and the number of times drivers had sat for their probationary licence.

Table 1 presents the distribution of responses for various attitudes toward speeding and the distribution of TIN's for speeding stratified by sex. At the time of licensing, just under one-third of all drivers considered that it was likely they would exceed the speed limit in the first 12 months of driving. Just over one-third of drivers considered they would not be caught by the police for speeding. This perception was strongest for males compared with females ($\chi^2 = 29.3$ $df = 2$, $p = 0.000$). Similarly, around a third of drivers considered that it was unlikely that their speeding would lead to a crash. Males were more likely to express this positive perception compared with females ($\chi^2 = 36.6$ $df = 2$, $p = 0.000$). Compared with females, males were also more likely to consider that speeding would add to the enjoyment of their driving trip ($\chi^2 = 84.9$ $df = 2$, $p = 0.000$). Speeding infringements accounted for 57.5% of all infringements incurred by the cohort in the first 12 months of driving. Twenty percent of drivers incurred one infringement, with a further 7.2% incurring two or more infringements. Compared with females, males were more likely to incur one or more infringements (33% versus 22.9%).

Table 1: Selected speeding variables by sex

| Variable | Sex | | |
|---|---------------|-----------------|---------------|
| | Male n=532 | Female n=745 | All n=1277 |
| Likelihood of driving faster than the posted speed limit first 12 months | | | |
| unlikely | 49.1 | 54.1 | 52.0 |
| unsure | 17.7 | 15.9 | 16.7 |
| likely | 33.2 | 30.0 | 31.3 |
| Likelihood of being caught by police if speeding | | | |
| unlikely | 43.3 | 28.8 | 34.8 |
| unsure | 18.3 | 21.4 | 20.1 |
| likely | 38.5 | 49.9 | 45.1 |
| Likelihood of having a crash if speeding | | | |
| unlikely | 40.3 | 26.4 | 32.3 |
| unsure | 23.1 | 20.9 | 21.8 |
| likely | 39.6 | 52.7 | 45.9 |
| Likelihood of enjoying the trip more if speeding | | | |
| unlikely | 33.6 | 56.4 | 46.8 |
| unsure | 27.2 | 25.2 | 26.1 |
| likely | 39.2 | 18.3 | 27.1 |
| Traffic Infringement Notices for speeding (first 12 months) | | | |
| none | 67.0 | 77.1 | 72.8 |
| one | 22.9 | 17.9 | 20.0 |
| two or more | 10.1 | 5.0 | 7.2 |

Four factors (confidence-adventurousness, skill, driving demeanour and alertness) were derived for the driving style and skill scale. These factors explained 39% of the variance. The internal reliability of the driving style and skill factors were 0.72, 0.85, 0.77, and 0.83, respectively. Scores for the four driving style and skill factors were derived by summing the raw values of the responses provided by participants for the items that comprised each factor. These scores were subsequently used in the multivariate analysis.

The results of the Negative Binomial Regression for speeding offences in the first 12 months of driving are presented in Table 2. All effects have been adjusted for socioeconomic status and driving exposure. Four variables were found to be significantly associated with incurring speeding infringement notices. Males were 67% more likely to incur a speeding infringement in the first 12 months of driving compared with females (RR=1.67, 95% CI=1.27-2.19). Drivers high in impulsivity and sensation seeking were found to have over twice the risk (RR=2.31, 95% CI=1.47-3.62) for speeding in the first 12 months compared with drivers low in impulsivity and sensation seeking. Driver confidence-adventurousness was also significantly related to speeding, with highly confident-adventurous drivers having over twice the risk (RR=2.17, 95% CI=1.31-3.59) of speeding compared with drivers low in confidence-adventurousness. The practice of positive health-related behaviours was found to be protective against speeding behaviour. Drivers who were categorised moderate to high on this variable were 35% (RR=0.65, 95%=0.45-0.92) and 40% (RR=0.65, 95%=0.45-0.92) respectively *less likely* to incur a speeding infringement compared with drivers who engaged in the lowest level of positive health-related behaviours.

Table 2: Predictors of speeding offences in the first 12 months of driving[#]

| Variable | Rate Ratio | 95% Confidence Interval |
|--|-------------------|--------------------------------|
| Sex | | |
| female ^(a) | 1.00 | -- |
| male | 1.67 | 1.27 to 2.19 |
| Impulsivity and Sensation Seeking | | |
| low ^(a) | 1.00 | -- |
| moderate | 1.48 | 0.99 to 2.20 |
| high | 2.31 | 1.47 to 3.62 |
| Confidence-Adventurousness | | |
| low ^(a) | 1.00 | -- |
| moderate | 1.46 | 0.95 to 2.25 |
| high | 2.17 | 1.31 to 3.59 |
| Positive Health-Related Behaviour | | |
| low ^(a) | 1.00 | -- |
| moderate | 0.65 | 0.45 to 0.92 |
| high | 0.60 | 0.36 to 1.00 |

^(a) baseline [#]model adjusted for socioeconomic status and driving exposure

Discussion

At the time of licensing, around a third of all drivers thought it was likely they would drive faster than the posted speed limit in the first 12 months of driving. Similarly, around a third of drivers considered it unlikely they would be caught by the police for speeding or that they would have a crash as a result of speeding. In support of previous studies where males have been found to perceive less risk than females regarding the outcomes of engaging in risky driving behaviours such as speeding (eg, Palamara 2000), males were less likely than females to consider that they would be caught by the police or crash if they were to speed. Further to this, males also demonstrated a stronger perception of the benefits of speeding. Just under 40% of males considered that their driving trip would be more enjoyable if they sped, compared with just 18% of females.

Traffic Infringement Notices for speeding were the most common infringement incurred by the cohort of young drivers in the first 12 months of driving. Approximately 57.5% of all infringements issued were for speeding, with 20% of drivers incurring one speeding infringement and 7% incurring more than one (to a maximum of six). The high proportion of speeding offences relative to other offences supports previous research of novice drivers where it was found that speeding offences accounted for 45% of all offences committed in the first year of driving (Forsyth et al 1995).

Independent effects for gender, risk-taking, driver identity and lifestyle were found for the commission of speeding offences. Males in this study were 60% more likely than females to have incurred a speeding infringement in the first year of driving. This finding supports other research in Western Australia which found that males incurred a greater number of speeding infringements than females over a three-year study period (Rosman 2000).

The link between a disposition toward risk taking and risky driving behaviour, such as speeding, has been reported consistently throughout the literature (e.g., Jonah 1997). Similarly, in this study, drivers who were categorised as high on a measure of risk taking (impulsivity and sensation seeking) were nearly two and a half times more likely than drivers low in risk taking to have incurred a speeding infringement in the first 12 months of driving. High sensation seeking persons are particularly problematic from a road safety and speeding countermeasure perspective as they are known to minimise the risks associated with high risk behaviour, are less likely to be deterred by punishment, and to focus more on the positive or beneficial aspects of the risky behaviour (Zuckerman 1994). Consequently, speeding countermeasures that focus on deterrence principles (e.g., being caught and fined) and on the health risks associated with speeding (e.g., crashing and injury) may be less effective with such a group of drivers.

Other research investigating the relationship between driver self-perception and driving behaviour have been cross-sectional in nature (e.g., Adams-Guppy and Guppy 1995), and therefore weak in regards to establishing a strong temporal and casual relationship between self-perceptions and driving behaviour. In this study however,

it was demonstrated that the perception drivers' have of themselves in terms of their driving style and skill at the time of licensing was found to be associated with incurring speeding infringements in the following 12 months of driving. Those who were categorised as highly confident-adventurous drivers were twice as likely to incur a speeding infringement in the first year of driving compared with drivers categorised as low in confidence-adventurousness.

Speeding can be construed as a health-related behaviour in that it has potential implications for the health of drivers since it increases their risk of crashing and injury. Not so surprisingly then, it was found that drivers who scored high on the practice of positive of health-related behaviours (i.e., minimal consumption of alcohol, no smoking, frequent exercise and use of sunscreen) were up to 40% less likely to incur a speeding infringement in the first 12 months of driving compared with drivers categorised as low on this dimension. This finding supports and extends other research demonstrating a relationship between lifestyle and traffic violations and crashes.

Speeding offences represent detected behaviour and consequently may not be a valid and reliable measure of a driver's habitual behaviour. The findings nevertheless indicate that future speeding resulting in traffic offences can be predicted by information obtained from the driver at the time of licensing. What remains to be investigated is how robust these predictors are with increasing driver experience and maturity or whether a driver's risk factors are subsequently moderated by incurring an infringement. Future research of the cohort will address both these issues.

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References

- Adams-Guppy J. and Guppy A. (1995) Speeding in relation to perceptions of risk, utility and driving style by British company car drivers. *Ergonomics*, **38**, 2525-2535.
- Alsop, J., Reeder, A., Begg, D. and Nada-Raja, S. (1998) Psychological and social predictors of traffic convictions among young New Zealand drivers. In proceedings *1998 Road Safety Research Policing and Education Conference, Wellington, New Zealand, 16-17 November*
- Begg, D., and Langley, J. (1998) Risky road traffic practices among a cohort of young adults in New Zealand. In proceedings *1998 Road Safety Research Policing and Education Conference, Wellington, New Zealand, 16-17 November*
- Beirness, D. and Simpson, H. (1988) Lifestyle correlates of risky driving and accident involvement among youth. *Alcohol, Drugs and Driving*, **4**, 193-204
- Causes of Death, Australia:1997 (1999) Australian Bureau of Statistics, 3303.0, Canberra.
- Forsyth, E., Maycock, G. and Sexton, B. (1995) *Cohort study of learner and novice drivers: Part 3, accidents, offences and driving experience in the first three years of driving*. Transport Research Laboratory, UK
- Gordon, C. and Hunt, M. (1998) The theory of planned behaviour applied to speeding, drink-driving and seat-belt use. In proceedings *1998 Road Safety Research Policing and Education Conference, Wellington, New Zealand, 16-17 November*
- Harrison, W., Triggs, T. and Pronk, N. (1999) *Speed and young drivers: Developing countermeasures to target excessive speed behaviour amongst young drivers*. Report No. 159 Monash University Accident Research Centre: Melbourne, Australia
- Jonah, B. (1997) Sensation seeking and risky driving: A review and synthesis of the literature. *Accident Analysis and Prevention*, **29**, 651-665.
- Kirov, C., Legge, M. and Rosman, D. (2000) *Reported road crashes in Western Australia 1999*. Road Safety Council of Western Australia

Kloeden, C. and McLean, J. Speed and the risk of involvement in a casualty crash. In proceedings *1998 Road Safety Research Policing and Education Conference, Wellington, New Zealand, 16-17 November*

Lajunen, T. and Summala, H. (1997) Effects of driving experience, personality and driver's skill and safety orientation on speed regulation and accidents. In T. Rothengatter and E. Vaya (eds.) *Taffic and transport psychology: Theory and application*. Pergamon Press: Amsterdam

Macdonald, W., Bowland, L., and Hancock, A. (1994) *Young driver research program - Mass crash data analysis: Overview of results from Australian and USA mass crash database analysis*. Federal Office of Road Safety: Canberra, CR 131 (11)

Mayhew, D., Donelson, A., Beirness, D., and Simpson, H. (1986) Youth, alcohol and relative risk of crash involvement. *Accident Analysis and Prevention*, **18**, 273-287.

National Injury Surveillance Unit (1995) *Injury Deaths Australia 1989-1993*, Australian Institute of Health and Welfare, Canberra.

Palamara, P. (2000) *Western Australian young driver cohort study: Rural cohort baseline report*. Road Accident Prevention Research Unit, University of Western Australia: Perth, RR96

Palamara P., Mullan N.G., and Spittle J.A. (1998) *A review of selected road crash statistics by age of road user: Western Australia 1987-1996*. Road Accident Prevention Research Unit, University of Western Australia: Perth, RR59

Rothengatter, T. and Manstead, A. (1997) The role of subjective norm in predicting the intention to commit traffic violations. In T. Rothengatter and E. Vaya (eds.) *Taffic and transport psychology: Theory and application*. Pergamon Press: Amsterdam

Rosman, D.(2000) *Drink-driving, speeding and road crashes in Western Australian, 1996-1998*. Road Accident Prevention Research Unit, University of Western Australia: Perth, RR100

Ryan, G.A., Kirov, C. and Cercarelli, L. (1999) *Speed and speed-related crashes in Western Australia, 1989-1997*. Road Accident Prevention Research Unit, University of Western Australia: Perth, RR78

Shope, J., Waller, P. and Lang, S. (1996) Alcohol-related predictors of adolescent driving: Gender differences in crashes and offences. *Accident Analysis and Prevention*, **28**, 45-52.

Stevenson, M., Palamara, P., Morrison, D. and Ryan, GA. (2000) Behavioural factors as predictors of motor vehicle crashes for young drivers. *Journal of Crash Prevention and Injury Control* (in press)

Zuckerman M. (1994) *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge Press: New York