# Can personality characteristics and attitudes predict risky driving behaviour among young drivers?

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## Abstract

A greater understanding of the personality factors and attitudes associated with risky young driver behaviour will assist in matching interventions to the individual needs of these drivers. There is an increasing body of research investigating relationships between these factors and the consequences of risky driving (i.e. traffic offences and crashes) among young drivers. However, there are a number of limitations associated with this research. Most studies are cross-sectional or retrospective in design, are based on self-reported driver behaviour outcomes, and do not adequately consider the role of driving exposure. The aim of this study was to identify personality characteristics and attitudes associated with young drivers caught engaging in risky driving behaviour using a prospective design and official driver records. This study also investigated whether any of these factors predicted different levels of driving exposure, defined as number of kilometres driven per year.

A total of 208 young drivers (aged 16 to 24 years) detected committing one or more traffic offences completed a questionnaire to determine whether personality characteristics and driving-related attitudes could predict traffic offences committed during the following year. The results indicated that a risky driving style and the use of driving to reduce tension were associated with a greater number of kilometres driven per year. Kilometres driven per year and the use of driving to reduce tension made independent contributions to the prediction of risky driving behaviour. The implications of these findings are discussed in terms of how interventions might be tailored to the needs of these young drivers.

## Keywords

Young drivers, driver behaviour, personality

## Introduction

In Australia and other industrialised countries, young drivers (aged 16 to 24 years) represent only a minor proportion of the licensed driving population, yet are substantially more likely to be involved in fatal and injurious crashes than older, more experienced drivers (e.g., Legge *et al.*, 2000; Shope *et al.*, 2001). Research suggests that approximately 90% of crashes are, to some extent, caused by human factors or road user behaviour (Shinar, 1978). Consequently, many studies have been undertaken to identify driver characteristics and behaviour associated with crash involvement.

Personality is a collection of emotion, thought and behaviour patterns unique to a person that interact to determine how individuals perceive and respond to events (Kassin, 2003). In the driving context, personality characteristics and attitudes can influence how individuals approach and behave in certain driving situations. Personality characteristics, by definition, are relatively stable over time and, therefore, changing them is not an appropriate objective for young driver countermeasures. However, understanding which personality factors predict

driver behaviour might assist in developing interventions and public education programs matched to the individual needs of young drivers. Moreover, identifying and modifying mediating factors linking personality to risky driving behaviour may be useful in changing young driver behaviour.

Personality characteristics and attitudes have been found to be weakly but consistently associated with young driver crash involvement (for a review, see Beirness, 1993; Elander *et al.*, 1993). However, the role of personality and attitudes in crash involvement may be underestimated because crashes are relatively rare events. As a result, any differences in crash rates attributed to personality and attitudinal factors will be difficult to detect statistically (see Evans, 2004 for a discussion). Moreover, crash causation is dependent on factors other than the behaviour of a particular driver, such as environmental circumstances (e.g., weather conditions), exposure (e.g., annual mileage), and the behaviour of other drivers (Friedstrom *et al.*, 1995; Struckman-Johnson *et al.*, 1989).

As crash data lacks stability and analyses of crash data lack statistical power, it is not an ideal outcome measure. An aggregate measure of multiple risky driving behaviours, such as traffic offences, might be more appropriate and reliable for examining the influence of personality on behaviour (e.g., Epstein, 1979; Ulleberg & Rundmo, 2003). Driver behaviour captured in traffic offence statistics is predominantly intentional and connected to the characteristics and motivations of the driver (Burg, 1970; Harrington, 1972).

An increasing body of research has shown that a variety of personality characteristics and attitudes have a stronger relationship with risky driving or the propensity to commit traffic offences than with crash involvement. From a review of the literature, Beirness (1993) concluded that personality factors accounted for about 10 to 20% of the variance in crashes and up to 35% of the variance in risky driving. However, this latter estimate is most likely at the higher end because, generally, personality rarely explains more than 25% of the variance in an individual's social behaviour (Argyle, 1983).

Some of the most prominent personality factors associated with risky driving include: sensation seeking, mild social deviance, hostility, aggression, and emotional instability (e.g., Jonah, 1997; Lawton *et al.*, 1997; Miles & Johnson, 2003; Patil *et al.*, 2006; Trimpop & Kirkcaldy, 1997). With respect to attitudes and behaviours, a risky driving style, the use of driving to reduce tension or stress, and a tolerant attitude towards risky driving behaviour have been associated with young traffic offenders (e.g., Baxter *et al.*, 1990; Beirness *et al.*, 1993; Mayer & Treat, 1977; Ulleberg & Rundmo, 2003).

Despite the increasing number of these studies, there are limitations associated with this research. Firstly, most of these studies were cross-sectional or retrospective in design, whereby the relationship between personality factors and driver behaviour was measured simultaneously or after driving incidents had occurred. A prospective design is advantageous in that personality measures (especially self-reported) can be obtained before being affected by crash involvement. Secondly, these studies predominantly relied on self-reported driver behaviour outcomes. Self-reported crash and traffic offence data allows for the possibility of intentional or unintentional misrepresentation (Elander *et al.*, 1993).

A final criticism is that many of the studies did not adequately consider the role of driving exposure. Generally, driving exposure varies with age (Massie *et al.*, 1997). However, there can also be considerable variation in the level of driving exposure and travel patterns within

different age groups. This is because driving exposure is not a random factor but an individual choice. Driving exposure has been found to vary among young drivers by factors such as sex, and motivation for driving (Crettenden *et al.*, 1994; Gregersen & Berg, 1994; Massie et al., 1997). Consequently, while personality and attitudes may influence the way in which an individual chooses to drive, reflected in traffic offences, it may also influence *how much* an individual drives (quantity of driving exposure). For example, drivers with high levels of sensation seeking might choose to drive more frequently to experience feelings of excitement, or drivers with emotional problems or high levels of hostility might choose to drive more frequently to release feelings of tension or stress.

The aim of the present study was to identify personality and attitudinal factors that predict subsequent traffic offences, recorded in official driver records, among young drivers. This study also investigated whether any personality and attitudinal factors predicted different levels of driving exposure, defined as the number of kilometres driven. This study contributes to past research on this topic by being the first study, to the best of our knowledge, to use a prospective design and official records to examine the role of personality and attitudinal factors among young drivers.

**Method**

*Participants*
The sample consisted of 208 young drivers (169 males, 39 females) aged 16 to 24 years (*M*=18.5, *SD*=1.2) who consented to the release of their driver records. Participants were recruited from the Driver Intervention Program, a small-group discussion-based workshop for drivers aged 25 years and under who violated the conditions of their learner's permit or provisional licence, resulting in licence disqualification. By definition, all participants recorded a traffic offence prior to participation in the study.

Participants were required to hold a current South Australian provisional driver's licence to ensure all had some unsupervised driving experience. Participants had held a provisional licence for an average of 1.4 years (*sd*=0.94) prior to questionnaire administration.

*Questionnaire*
Participants completed an extensive self-report questionnaire consisting of 136 items. The measures included in this questionnaire were selected for their known association with risky driving and crash involvement in the literature. The questionnaire took approximately 10 to 15 minutes to complete.

The first part of the questionnaire sought information on a number of general demographic, licensing, and background variables including driving exposure (estimated number of kilometres driven). The second section consisted of 72 true-false items measuring general personality traits: assertiveness (Rathus, 1973), depression (mood rather than clinical symptoms; Costello & Comrey, 1967), emotional adjustment (Howarth, 1976), and sensation seeking (Disinhibition and Thrill and Adventure Seeking scale; Zuckerman, 1971). In addition, five measures of the expression of hostility or aggression were included (Buss & Durkee, 1957): assaultiveness, indirect hostility, verbal hostility, irritability, and resentment. A further 20 true-false items measured a variety of driving-related attitudes and behaviours, that is, behavioural expressions of personality factors in the driving context: driving aggression (Parry, 1968), an attitude of competitive speed (Goldstein & Mosel, 1958), driving inhibition (cautious driving when upset or angry; Donovan & Marlatt, 1982), and the extent to

which driving reduced tension (Mayer & Treat, 1977; Pelz & Schuman, 1971). In following sections, a measure of mild social deviance (West *et al.*, 1993), self-reported driving style or risky driving (Deery & Love, 1996), and eight separate items measuring specific driving attitudes were also incorporated, as was alcohol consumption, which is another measure of high-risk behaviour. The internal consistency of these measures has been established in other research (see Wundersitz & Hutchinson, 2006).

*Official Driver Records*
To obtain official traffic offence records, participants provided their driver's licence number. Driver licence numbers were used to search the DRIVERS database for traffic offences detected by police on South Australian roads. DRIVERS does not include infringements from speed cameras and so the number of traffic offences recorded was an underestimate of the true number of offences.

The traffic offence records of participants were tracked for 12 months following questionnaire administration. It is acknowledged that some drivers (*n*=53) were disqualified for part of this period. Consequently, the number of subsequent traffic offences recorded is likely to be an underestimate. Nevertheless, research suggests around one third of disqualified drivers continue to drive while disqualified (Watson, 2002). It is unknown to what extent the disqualified drivers in this study continued to drive.

*Statistical Analysis*
Statistical analyses were performed to determine if young drivers recording subsequent traffic offences possessed certain personality characteristics and attitudes. For univariate analyses, chi-square tests were conducted for categorical variables and independent samples *t*-tests were conducted for continuous variables. Note that if the assumption of normally distributed data was violated, *t*-tests were performed using Welch's procedure because it does not assume equal population variances, making the *t*-test more robust.

Cohen's *d*, a standardised measure of the effect size or strength of the difference between means, was reported for *t*-tests with significant results. According to Cohen's guidelines (Cohen, 1988), an effect size of *d*=0.2 represents a small effect, *d*=0.5 a medium effect, and *d*=0.8 a large effect.

Binary logistic regression was conducted for the multivariate analysis. Logistic regression does not make any assumptions about the statistical distribution of individual drivers' traffic offence frequency.

**Results**

Analysis of official driver records showed that 38% (*n*=80) of young drivers were detected committing at least one traffic offence during the 12-month period following questionnaire administration. Figure 1 shows the distribution of the number of traffic offences. Just over 14% (*n*=30) of young drivers recorded two or more traffic offences in the following year.
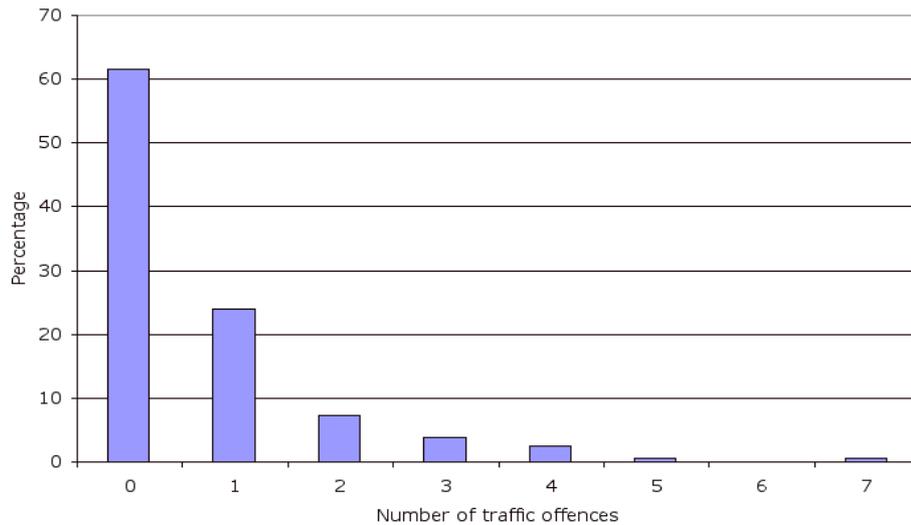
**Figure 1 Distribution of the number of traffic offences recorded after questionnaire administration**

The demographic characteristics, licensing information, and driving exposure of young drivers with and without a recorded traffic offence during the 12-month follow up period are shown in Table 1. Males (43%) were statistically significantly more likely to record a traffic offence than females (21%) ($\chi^2(1) = 6.5$, $p=.011$). Traffic offence status was not related to age or any of the driver licensing variables.

**Table 1 Background variables for young drivers recording and not recording a subsequent traffic offence**

| Variables | None | At least one | *p*-value |
|---|---|---|---|
| Sex (%) | | | |
|   Males | 57.4 | 42.6 | 0.011 |
|   Females | 79.5 | 20.5 | |
| | | | |
| Age (years) (*sd*) | 18.4 (1.1) | 18.6 (1.4) | 0.205 |
| | | | |
| Months with Learner's Permit | | | |
|   6 months or less | 60.7 | 39.3 | 0.491 |
|   7 months or more | 66.7 | 33.3 | |
| Age obtained Provisional licence | | | |
|   Under 17 years | 60.4 | 39.6 | 0.658 |
|   17 years or more | 63.4 | 36.6 | |
| Driving experience on Provisional licence | | | |
|   Less than 12 months | 64.8 | 35.2 | 0.600 |
|   12 months or more | 60.8 | 39.2 | |
| | | | |
| Kilometres driven per year | 14,172.8 | 21,364.5 | 0.007 |
| (*sd*) | (12,136.8) | (19,633.8) | |

Driving exposure was measured in terms of the estimated number of kilometres driven per year. Drivers recording at least one traffic offence reported driving more kilometres per year than drivers without a traffic offence ($t$ (100) = 2.7, $p$=.007).

*Kilometres Driven per Year (Driving Exposure)*
Personality characteristics and attitudes may influence driving exposure or the number of kilometres driven per year. To investigate this possibility, a linear regression procedure was performed with kilometres driven per year as the dependent variable and all other personality and attitude measures, including sex, as predictor variables. A stepwise procedure was used for the analysis, with the level of significance required for entry into the equation set at $p$<.05.

The results of this procedure, presented in Table 2, indicated that a risky driving style and the use of driving to reduce tension were the two best predictors of kilometres driven per year. However, the model featuring these two variables accounted for only 7% of the variance (Adjusted $R$ squared).

**Table 2 Results of a linear regression predicting kilometres driven per year, using personality and attitudinal measures as predictors (*N=179*)**

| Variables in model (order of entry) | $B$ | Adj $R^2$ | $\beta$ | $t$ | $p$-value |
|---|---|---|---|---|---|
| Risky driving style | 494.68 | 0.05 | 0.19 | 2.61 | 0.010 |
| Tension reduction | 3129.40 | 0.07 | 0.17 | 2.35 | 0.020 |

Note: Final model $F$(178) =7.97, $p$<.001

*Traffic Offences*
To determine if young drivers recording subsequent traffic offences were characterised by certain personality measures and attitudes, their mean scores on such measures were compared to drivers who did not record a traffic offence. The results are displayed in Table 3.

There were no statistically meaningful differences in the means of personality measures for drivers with and without subsequent traffic offences. Analysis of hostility measures indicated drivers recording a traffic offence had higher levels of assaultiveness ($d$=0.32) but lower levels of indirect hostility ($d$=0.28) than drivers without traffic offences. The effect sizes indicate that these differences were small. For driving-related measures, several differences were found: drivers recording a traffic offence reported higher levels of competitive speed, used driving to reduce tension, and had a riskier driving style. The corresponding effect sizes for these measures were in the small to medium range ($d$=0.44, $d$=0.38, $d$=0.39, respectively). The attitudinal measures, specific to road safety, suggested that drivers recording a traffic offence thought speeding was acceptable ($d$=0.32).

**Table 3 Mean scores on selected personality and attitudinal measures for drivers recording subsequent traffic offences and no subsequent traffic offences (N=208)**

| Measure | At least one offence (*n*=80) | | No offences (*n*=128) | | *t*-value | *df* | *p*-value |
|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | | |
| Personality | | | | | | | |
|   Assertiveness | 7.94 | 1.32 | 7.83 | 1.33 | 0.58 | 206 | 0.563 |
|   Depression | 10.48 | 1.84 | 10.05 | 1.81 | 1.62 | 206 | 0.107 |
|   Emotional adjustment | 7.49 | 1.49 | 7.49 | 1.55 | 0.02 | 206 | 0.983 |
|   Sensation seeking | 26.81 | 3.28 | 26.67 | 3.52 | 0.29 | 206 | 0.774 |
|   Mild social deviance | 12.29 | 2.96 | 11.80 | 2.86 | 1.19 | 206 | 0.236 |
| Hostility and aggression | | | | | | | |
|   Assaultiveness | 13.85 | 1.96 | 13.18 | 2.22 | 2.22 | 206 | 0.028 |
|   Indirect hostility | 7.59 | 1.29 | 7.97 | 1.36 | 2.01 | 206 | 0.046 |
|   Verbal hostility | 13.86 | 1.71 | 13.68 | 1.82 | 0.72 | 206 | 0.472 |
|   Irritability | 11.44 | 1.71 | 11.25 | 2.01 | 0.69 | 206 | 0.489 |
|   Resentment | 5.66 | 1.21 | 5.42 | 1.12 | 1.46 | 206 | 0.146 |
| Driving-related | | | | | | | |
|   Aggression | 13.30 | 2.52 | 12.92 | 2.60 | 1.03 | 206 | 0.303 |
|   Competitive speed | 7.74 | 1.62 | 7.00 | 1.72 | 3.08 | 206 | 0.002 |
|   Inhibition | 4.25 | 1.15 | 4.55 | 1.13 | 1.88 | 206 | 0.062 |
|   Tension reduction | 3.44 | 0.76 | 3.11 | 0.92 | 2.80 | 189 | 0.006 |
|   Risky driving style | 20.27 | 6.10 | 17.87 | 6.19 | 2.75 | 206 | 0.007 |
| Attitudes [a] | | | | | | | |
|   Speeding acceptable | 2.93 | 1.29 | 2.52 | 1.29 | 2.18 | 206 | 0.030 |
|   Drink driving acceptable | 2.45 | 1.56 | 2.59 | 1.72 | 0.62 | 180 | 0.535 |
|   Low risk of dying in a crash | 1.88 | 1.16 | 1.82 | 1.18 | 0.33 | 206 | 0.744 |
|   Friends don't drive safely | 3.14 | 1.28 | 3.13 | 1.18 | 0.07 | 206 | 0.943 |
|   Low likelihood of being caught | 2.35 | 1.20 | 2.44 | 1.31 | 0.48 | 206 | 0.629 |
|   Lack of concern for hurting others | 1.84 | 1.25 | 1.61 | 1.17 | 1.34 | 206 | 0.183 |
|   Poor driving skill | 2.03 | 1.07 | 2.05 | 1.01 | 0.20 | 206 | 0.840 |
|   Low safety motivation | 2.09 | 1.07 | 2.11 | 1.05 | 0.15 | 206 | 0.885 |

Note: For each measure, higher scores indicate higher levels of the variable, except for emotional adjustment where higher scores indicate lower levels of adjustment.
[a] For each attitude measure, higher scores indicate non-safety orientated attitudes.

To determine whether any personality characteristics or attitudes *predicted* subsequent traffic offences, all measures that differed by traffic offence record in univariate analyses were entered into a logistic regression (dependent variable: no offences/at least one offence). Sex

and kilometres driven per year were also included as predictor variables because group differences were found in univariate analyses.

The results from the logistic regression, summarised in Table 4, show that kilometres driven per year and the use of driving to reduce tension made independent contributions to the prediction of risky driving behaviour. A positive regression coefficient for both variables indicates that the probability of recording at least one subsequent traffic offence increased with higher levels of driving to reduce tension and with the greater number of kilometres driven. The odds ratio indicated that drivers who used driving to reduce tension were 1.5 times as likely to record a subsequent traffic offence. No other personality measures predicted traffic offences. This model was statistically significant ($\chi^2(3) = 17.1$, $p=.001$).

**Table 4 Results of logistic regression analysis for predicting at least one subsequent traffic offence, using personality and attitudinal measures as predictors ($N$=179)**

| Measure | $B$ | SE | Wald | $p$-value | Odds ratio | 95% CI |
|---|---|---|---|---|---|---|
| Tension reduction | 0.38 | 0.19 | 3.88 | 0.049 | 1.47 | 1.00 – 2.15 |
| Kilometres driven per year | <0.01 | <0.01 | 4.33 | 0.037 | 1.00 | 1.00 – 1.00 |
| Sex | 0.81 | 0.47 | 2.98 | 0.084 | 2.25 | 0.90 – 5.65 |

Note: Data for kilometres driven was missing for 29 participants.

**Discussion**

Understanding which personality factors and attitudes predict risky driving behaviour might assist in matching interventions to the individual needs of young drivers. Consequently, the principal purpose of the present study was to identify personality and attitudinal factors associated with traffic offences among young drivers using official driver records. By using a prospective design, we attempted to minimise the effects of any crash experience on self-reported measures of individual differences.

Based on the findings from this study, a flow chart showing the predictors of traffic offences, incorporating kilometres driven per year, is illustrated in Figure 2.
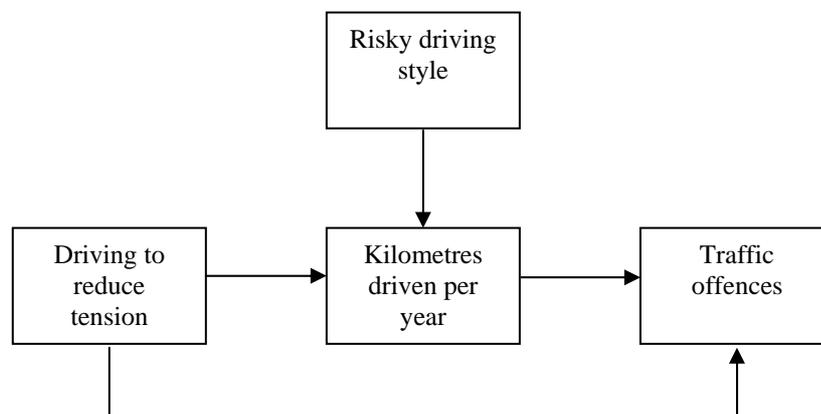


**Figure 2 Flow chart of predictors of traffic offences for young drivers**

The results of this study demonstrated that traffic offences, a measure of risky driving behaviour, were predicted by kilometres driven per year and a driving-related behavioural measure, driving to reduce tension. Finding relationships between variables and traffic offences reported in official records is notable given that offences reported in driver records are relatively uncommon and under-represent the actual number of risky driving behaviours performed (i.e., they contain only the number of times a driver was detected offending). In contrast to previous research using self-reported driving behaviour outcomes, none of the specific personality variables was associated with traffic offences.

Although there are many advantages of using official driver records over self-reported data (i.e. avoid misrepresentation and poor recall), there are some limitations associated with official records that affect their ability to detect relationships. Zylman (1972) argued that research based solely on official driver records may yield spurious results and, in many cases, non-significant results because the likelihood of recording a crash or traffic offence may be more dependent on local policies and practices than the driver's proficiency or driving behaviour. Moreover, not all traffic offences are enforced equally and this may bias the data such that some groups of drivers are over-represented (Smiley et al., 1991).

An interesting finding of this study was that using driving to reduce tension predicted kilometres driven per year and traffic offences (independent of kilometres driven per year). Social learning theory suggests that if an individual has not learnt sufficient means of coping with tension or frustrations, driving may be used as a way of venting these feelings (Grey et al., 1989). The findings of the present study are consistent with other studies that found the use of driving to release tension was associated with traffic offences and crash involvement, particularly among males (Donovan *et al.*, 1985; Harano *et al.*, 1975; Mayer & Treat, 1977).

It is important to note that the use of driving to reduce tension is not a personality trait but a behavioural expression of such traits in the driving context that has been learned and so is more amenable to change. Consequently, it may be beneficial to develop interventions or public education programs for young drivers that highlight the importance of using effective strategies to deal with feelings of tension or stress, other than on the road.

The finding that kilometres driven per year predicted traffic offences is consistent with previous research (e.g., Taubman Ben Ari, 2008; Trimpop & Kirkcaldy, 1997). High levels of driving exposure or kilometres driven has consistently been correlated with traffic offences because greater driving exposure allows greater opportunity to commit, and be detected committing a traffic offence. This finding reinforces the view that kilometres driven should be included as a covariate when examining factors associated with driver behaviour. However, note that the measure of driving exposure in this study was based on self-reported estimates of kilometres driven. By nature, self-report data is unreliable because it is subject to poor recall and misrepresentation.

The association between risky driving style (i.e., the manner in which one chooses to drive), the use of driving to reduce tension, and kilometres driven per year suggests greater distance driven represents, to a small extent, unsafe or risky motives for driving. This notion is consistent with some previous research. For example, Gregersen and Berg (1994) found that high-risk young drivers with a greater level of driving exposure were characterised by an interest in cars, being "out and about", and driving for extra motives other than transport. Similar to the present study, the majority of the group were male (about 80%). A recent study

by Møller and Gregersen (2008) found that risk-taking behaviour is functional in the life of young drivers. Young drivers use risk-taking behaviour as a tool to gain status and to "let off steam", similar to driving to reduce tension. So, there is some evidence that young drivers drive for motives other than safety and these motives are related to their general life situation.

Alternatively, young drivers' risky driving style and resultant higher kilometres driven per year may serve purposes associated with adolescent development not examined in this study, such as opposing authority, asserting independence, and impressing peers (Jessor *et al.*, 1997). Future research could further investigate risky motives for driving. Nevertheless, whether kilometres driven is an expression of maleness, an interest in cars or a claim to adulthood, the modification of these motivations for driving might reduce the amount of kilometres driven by young drivers, resulting in crash reductions.

The prospective design of this study provides an opportunity to continue following the driver records of these young drivers for two to three years to accumulate a greater number of recorded traffic incidents (but bearing in mind that crash risk is not stable and varies with age). A prospective examination of the characteristics of young drivers detected for several offences or crashes would provide a convincing means of understanding the role of personality characteristics and attitudes in young driver behaviour. Findings from this research would be valuable in further developing and tailoring interventions to the individual needs of young drivers and consequently reducing young driver crash risk.

### Acknowledgements

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