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The development of risky attitudes from pre-driving to fully-qualified driving

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Word count: 3436
ABSTRACT

Objective: Young drivers are at increased crash risk as a result of adopting risky driving styles. This paper examines the development of risky attitudes from pre-driving to fully qualified driving, focussing on speed related attitudes.

Design: Data are drawn from a UK longitudinal study of adolescent behaviour development in the general population (the G1219 study).

Subjects: At baseline (modal age 17 years) there were 1596 participants only 18% of whom were fully qualified drivers. At follow-up (modal age 20 years) 64% were fully qualified drivers.

Main Outcome measures: Attitudes to driving violations, particularly speeding, were measured in all participants at both assessments. Self-reported driving violations, also related to speeding, were measured in fully qualified drivers at follow-up.

Results: Attitudes became riskier with driver training/experience. Baseline attitudes measured in pre-drivers did not independently predict violations in those that had become fully-qualified drivers at follow-up. The attitudes of learner and fully qualified drivers at baseline independently predicted violations at follow-up.

Conclusions: These results indicate that the driver training period offers a promising opportunity for interventions to develop safer driving attitudes.
WHAT IS ALREADY KNOWN

- Risky attitudes and behaviours are linked to crash involvement in young drivers
- Risky attitudes may develop during the pre-driving period

WHAT THIS STUDY ADDS

- Attitudes to violations focussing on speed become riskier during driver training
- Attitudes in pre-drivers do not independently predict risky driving behaviour 3 years later
- Attitudes in learner drivers do predict risky driving 3 years later
Road traffic crashes provide a major public health challenge. In 2010 there were 1,850 fatalities on UK roads and 22,690 serious injuries. Young drivers, particularly males, are over-represented in many crash types. For example adolescent drivers (aged 15-19 years) were more vulnerable to single vehicle fatalities than adults aged 45-64 (odds-ratio =1.64 for males and 1.45 for females) in the US, 2005-2009. Inexperience performs a role here, with faulty risk and hazard perception likely to be involved. However, choice of risky behaviours such as speeding and dangerous overtaking, is also important.

The antecedents of risky driving can be found before fully qualified driving begins. In the UK pre-drivers include people with no licence, who are prohibited from driving on public roads and those who hold a provisional licence (available from age 17) allowing supervised driving (learners). Drivers become fully qualified on completion of the UK driving test that can be taken from age 17, with no minimum period holding a provisional licence. Longitudinal studies showing adolescent behavioural difficulties predict driving risk show that characteristics present before training begins influence driving behaviour. Further evidence shows driving attitudes have similar correlates in pre-drivers and full licence holders.

Pre-driving is an attractive period for intervention as attitudes may be more malleable before habits form. If driving experience results in attitude change then interventions may be targeted at key points to prevent negative changes and accentuate positive ones. A full understanding of attitude development across training is required to target interventions most effectively. Risky driving becomes more frequent as novice drivers gain experience and this effect may begin when experience starts to accrue during training. Not all studies find an effect of experience prior to fully licensed driving. However, one unpublished study indicates that attitudes to driving violations (largely focussed on speed) are riskier in fully qualified
drivers than in learners and riskier in learners than non-drivers (Rowe, Andrews & Harris,
manuscript submitted). This unpublished study also found that a measure of willingness to
commit a wider range of violations showed the opposite relationship with driving experience.
Therefore further studies are required to clarify the relationship between driving experience and
attitudes during pre-driving.

A further issue in effectively delivering interventions is to target stages where attitudes
optimally predict future behaviour. For example, learner drivers’ attitudes might predict later
behaviour more accurately than non-drivers’ attitudes as training experience may have already
started to shape attitudes. One study found a correlation of .28 between pre-driver speeding
attitudes and risky driving behaviour 12 months later. This study did not test whether
prediction of future behaviour was similar for non-drivers and learner drivers at baseline.

We address the development of driving attitudes across training in a UK cohort
study. We use the attitudes to driving violations scale as our primary attitudes measure.
As noted above, this scale focuses primarily on speed which is a key contributor to crash
involvement. First we examine whether this measure changes with driving experience, using
cross-sectional and longitudinal analyses. Second, we examine the longitudinal prediction from
attitudes to behaviour, testing whether the strength of the relationship varies depending upon
baseline driving experience. Given that males are riskier drivers than females, we test whether
identified associations were moderated by sex throughout our analyses.

METHODS

Study population

G1219 includes participants from two sources, a community sample of siblings and a
random selection of live twin births (between 1985 and 1988) identified by the UK Office of
National Statistics. Sample recruitment and retention is fully described elsewhere. At wave 1, 3,640 respondents aged 12 to 19 years participated. Wave 3 (collected in 2004) was the first contact to include driving measures and is referred to as the baseline here. This wave contained 1,596 adolescents (44% of the Wave 1 sample) with modal age 17 years (range 14-23) and 60% were female. The next contact (Wave 4, referred to here as the follow-up) was conducted approximately 3 years later (2007) and there were 1,556 participants (including 74% of wave 3 respondents as well as additional study members who had participated at wave 2 but not at wave 3). At this point the modal age was 20 years (range 18-27 years). Informed consent was obtained from parents/guardians of all study members under 16 years, and from study members themselves when over 16. Ethical approval for different stages of this study has been provided by the Research Ethics Committees of the Institute of Psychiatry, South London and Maudsley NHS Trust, and Goldsmiths, University of London. At wave 1, levels of parental education were somewhat higher (39% educated to A-level [US equivalent High School Diploma] or above) than in a large nationally represented sample of parents where 32% were educated to this level. Throughout the study, loss to follow up was associated with being male, higher on antisocial behaviour, living in rented accommodation and lower maternal education.

The characteristics of the sample at baseline and follow-up contacts are shown in Table 1 including the distribution of driving licences at each stage. At follow-up, fully-qualified drivers reported that they had held their licence for 2.69 years (sd=1.88) on average and their weekly mileage was most commonly reported as 1-50 miles (39%), with 51-100 miles (25%) next most common.

<Table 1>

**Measures**
Attitudes to Driving Violations

The Attitudes to Driving Violations Scale\(^{14}\) was presented to all participants at baseline and follow-up. Items are shown in Table 2. Responses are made on a 5-point scale labelled Strongly Disagree (scoring 5) to Strongly Agree (scoring 1). The scale is usually scored as the total of the 7 items providing a potential range of 7-35 with higher scores indicating riskier attitudes. The original validation study recruited a sample of 406 drivers and found the scale had a Cronbach’s alpha of .76 and correlated with self-reported speeding and crash involvement.\(^{14}\)

In our sample, alpha reliabilities were .72 at both baseline and follow-up.

<Table 2>

Driving Behaviour

Driving violations were measured at follow-up in fully qualified drivers using items from the ordinary violations sub-scale of the Driver Behaviour Questionnaire (DBQ).\(^{18}\) The questionnaire addresses violation frequency during the previous year on a 6-point scale ranging from never (scoring 0) to nearly all the time (scoring 5).\(^5\) A recent meta-analysis including 70 DBQ studies found a correlation of .13 between violations and crash involvement.\(^9\) This study also reported new analyses of a large-scale UK sample of novice drivers showing DBQ violations measured at 6 months after licensing correlated with crash history at .15 and predicted future crash involvement over the next 6 (r=.14), 18 (r=.14) and 30 (r=.12) months.\(^9\) Space restrictions in the G1219 mail-out meant only four of the usual seven items were included. These were chosen as the strongest loading items in a factor analysis based on a large UK sample\(^{19}\) and they showed good alpha reliability (.73) in our sample. The DBQ is usually scored as the mean of responses, with higher scores indicating more frequent violations.
At follow-up, drivers were also asked the date they obtained their full licence and to report their usual weekly mileage as 0, 1-50, 51-100, 101-200 or 200+. Mileage was treated as a continuous variable, scored 0 to 4.

Analyses

The G1219 sample contains sibling pairs of differing genetic relatedness (identical twins, non-identical twins and full siblings) for the purpose of identifying genetic and environmental contributions to variance in behavioural traits. The current analyses address relationships between variables at the phenotypic level and therefore do not utilise the twin/family design. All analyses were conducted using the survey models of Stata 10.1 which adjust results for the non-independence of observations taken from the same family. These models are also robust to minor violations of some of the usual regression assumptions, including the normality assumption in linear regression. Linear regression models were used when predicting attitudes and behaviours with licence status coded as a categorical predictor using dummy variables. Within participants at each contact, missing data on the variables of interest was limited to between .5% and 1.5% of cases. There were slightly more missing responses for duration licence held (6%). Individuals without complete data on key variables were omitted from all analyses. In order to use as much of the available data as possible, analyses at single time points included all available participants irrespective of whether they participated at the other wave. Longitudinal analyses required participants to be present at both time points.

RESULTS

Driving attitudes and behaviour

Table 3 shows descriptive statistics regarding the driving-related variables and their relationship with age, sex and driving experience. Attitudes to driving violations were
significantly riskier in males than females and riskier attitudes were positively associated with age at baseline but not follow-up. In fully qualified drivers riskier attitudes were associated with higher mileage and with licence duration. Violations were more common in males than females, negatively correlated with age and positively correlated with driving exposure. After controlling for the effects of age, sex and driving exposure, riskier attitudes were associated with more frequent violations ($\beta=.43$, 95% CI: .36, .49, $p<.001$).

**Are driving attitudes associated with licence status?**

Figure 1 shows mean attitude scores at each licence stage. We conducted regression models predicting standardised attitudes from licence status (coded with dummy variables), controlling for age and sex. At baseline, fully qualified drivers had riskier attitudes than non-drivers ($b=.59$, 95% CI: .41, .76, $p<.001$) and learner drivers ($b=.36$, 95% CI: .20, .52, $p<.001$). Learners had significantly riskier attitudes than non-drivers ($b=.23$, 95% CI: .09, .36, $p=.001$). An additional interaction term between licence status and sex was non-significant ($F(2, 860)=.00$, $p=.998$).

We repeated the analysis using the follow-up data and found the interaction between sex and licence status was significant ($F(2, 890)=3.46$, $p=.032$). In males the pattern was similar to baseline: fully qualified drivers reported riskier attitudes than non-drivers ($b=.75$, 95% CI: .49, 1.00, $p<.001$) and learner drivers ($b=.33$, 95% CI: .10, .56, $p=.005$), and learners had riskier attitudes than non-drivers ($b=.42$, 95% CI: .11, .72, $p=.008$). For females, fully licenced drivers had riskier attitudes than non-drivers ($b=.45$, 95% CI: .27, .34, $p<.001$) and learners ($b=.54$, 95% CI: .38, .70, $p<.001$) but there was no difference between learners and non-drivers ($b=-.08$, 95% CI: -.29, .12, $p=.423$). Age was not associated with attitude once licence status was accounted
for, at baseline ($\beta=-.06, 95\% \text{ CI: } -.13, .01, p=.109$) or follow-up ($\beta=.01, 95\% \text{ CI: } -.04, .06, p=.710$).

*Figure 1*

**Do attitudes change as a result of training/experience?**

These analyses focussed on the 659 non-drivers at baseline. Of these participants 323 had become fully qualified drivers at follow-up, 199 were learning to drive and 137 remained non-drivers. As shown in Figure 2, attitudes became riskier in those who became fully qualified drivers between baseline and follow-up (Cohen’s $D=.33$). There was no evidence of change in those who remained non-drivers ($D=.01$) or began learning to drive ($D=.11$). Controlling for age and sex, there were no differences in baseline attitudes between participants who did not learn to drive before follow-up and those that began learning to drive or became fully qualified before the follow-up assessment ($F(2, 420)=.45 \ p=.636$). Significant differences only emerged at follow-up ($F(2, 420)=8.94, p<.001$). In order to test whether learning to drive between baseline and follow-up predicted change in attitude, we ran a regression model predicting standardised follow-up attitudes with licence status at wave 4 (coded with dummy variables), controlling for baseline attitude, age and sex. In this model those who learnt to drive had significantly riskier attitudes at follow-up than participants who remained non-drivers ($b=.34, 95\% \text{ CI: } .15, .54, p=.001$) and participants who had started training but not completed it ($b=.29, 95\% \text{ CI: } .13, .45, p<.001$). The comparison of those who remained non-drivers and those who had begun driver training was non-significant ($b=.06, 95\% \text{ CI: } -.15, .26, p=.593$). An additional interaction term between sex and licence status was non-significant ($F(2, 420)=1.22, p=.300$), indicating the effect of learning to drive was not significantly different for males and females. These results are consistent with
the hypothesis that driving experience influences attitudes rather than that those with riskier
attitudes start to drive earlier.

<Figure 2>

The above analyses did not indicate whether change in attitudes happened immediately
after gaining a full licence or gradually with the acquisition of experience. Next we examined
whether attitudes were linearly related to the time since qualifying to drive at follow-up. The
zero-order correlation between attitudes and time since acquiring a full licence was .13 (p<.001).
Mean attitude scores were 18.74 (SD=4.17) for participants in their first year of fully qualified
driving, 19.61 (SD=4.06) in the second year and 20.45 (SD=4.10) in the third year and beyond.
Therefore it appears there was a linear relationship between driving experience and attitude.

Do pre-licence attitudes predict fully qualified driving behaviour?

We tested the longitudinal prediction of violations from attitudes using only fully
qualified drivers at follow-up (N=775). Table 4 shows that these participants were most
commonly non-drivers at baseline (41%), 30% were learners and 29% were fully qualified
drivers. As Table 4 shows, violations were more strongly correlated with the prior attitudes of
full and provisional licence holders than they were with non-licence holders. We ran a multiple
regression model predicting violations from baseline attitudes, licence status, and their
interaction. Sex, age and regular mileage were also included as covariates\(^1\). The model showed a
significant interaction between baseline licence status and attitude (F(2, 519)=3.55 p=.029). As
shown in Table 4, attitudes significantly predicted violations in those who were fully qualified
drivers at baseline and in those who were learners, but not in those who were non-drivers at

\(^1\) Duration licence held was not included as a covariate as this was closely related to licence
status at baseline, although the pattern of results was similar when this covariate was included.
baseline. Sex did not moderate the prediction of violations from baseline attitudes in non-drivers (p=.586), learners (p=.689) or fully qualified drivers (p=.223).

<Table 4>

DISCUSSION

G1219 provides a unique opportunity to study the development of driving attitudes from pre-driving to fully-qualified driving in a large general population sample. We found driving attitudes were riskier in fully qualified drivers than in learners and non-drivers, independently of age and sex at baseline and follow-up. Learners had riskier attitudes than non-drivers at baseline. At follow-up learners were riskier than non-drivers in males but not females. The reasons for this minor discrepancy between data collection waves are unclear. Further analyses did not identify any other evidence that sex moderated prediction of attitudes and behaviour. Therefore, overall, our results provide little evidence that the processes underlying risky driving differ substantially by sex.

The longitudinal design of G1219 allows us to examine the mechanisms underlying the cross-sectional association we identified between licence status and risky attitudes. At baseline there were no differences between those who would go on to gain driving experience in the follow-up period and those who would not. Attitudes became riskier in those who became fully qualified drivers between baseline and follow-up whereas there was no change in attitudes for those who remained non-drivers or had become learners at follow-up. These analyses indicate that attitudes become riskier with experience rather than that people with riskier attitudes learn to drive earlier.

It may be that the development of riskier attitudes with driving experience is specifically related to speed. As noted above, the association between riskier scores on the Attitudes to
Driving Violations Scale and licence status has been observed elsewhere (Rowe, Andrews & Harris, submitted), but a different pattern of results was reported for a measure addressing violations more widely. This does not diminish the importance of the results reported here, however, given that driving speed is an important contributor to crash involvement. Our data do not directly address why attitudes become riskier with experience. One possibility is that confidence in the ability to handle speed and experience of the relatively forgiving nature of the road environment makes drivers feel that speeding is less risky than they thought initially.

Our findings regarding longitudinal prediction of violations from attitudes also indicate that attitudes change with training and experience. In learners and fully qualified drivers at baseline there was significant prediction from attitudes to violation behaviour at follow-up. In non-drivers at baseline who became fully qualified drivers before follow-up, the prediction from attitudes to behaviour was not independently significant. We are aware of only one other longitudinal study that has predicted driving behaviour from pre-driving attitudes. This study did find a correlation between attitudes in pre-drivers and their driving behaviour over a one year period rather than the three year follow-up of our study. A key strength of our study is the comparison of prediction of violations from attitudes at different baseline stages of driver training. Our results show that prediction is stronger in those who are currently driving and in learners than in non-drivers and this has implications for injury prevention initiatives as discussed below.

Our results must, however, be considered in the context of some limitations. The retention of participants from baseline to follow-up was incomplete, as is inevitable in studies of this nature. Loss of observations will lead to lower statistical precision and may also introduce bias. We rely upon self-report for all measures, although it should be noted that self-report
measures of this sort have been well validated in comparison with performance data. It would be helpful for replications to include measures from other reporters who are familiar with the participants’ driving behaviour and also take more objective measures of risky driving behaviour such as criminal and medical records.

**Implications for prevention**

The high costs associated with risk-taking in young drivers makes developing preventative measures a priority. This might involve a range of different approaches including tougher legislation for violating motoring laws and graduated licensing programmes to reduce unsupervised driving during the early stages of novice driving. Interventions aiming to improve attitudes and behaviour in young drivers are likely to continue to perform a central role in these efforts, in part due to their public acceptability and relatively small cost. Our findings have implications for identifying the best developmental stage in which to target such interventions. We found that attitudes only predict driving behaviour independently when driver training has begun. This has implications for the utility of targeting non-drivers with attitude interventions. As the attitudes of non-drivers were not independently predictive of violations during fully qualified driving it seems less plausible that manipulating non-drivers’ attitudes will modify future driving behaviour. This study did not manipulate attitudes directly however. We believe randomised control trials of the effectiveness of non-driver attitude modification remain a priority for future research. In the absence of this evidence, our results offer a cautionary message to organisations considering investing in non-driver attitude training.

Our results indicate that the learner driver stage (as indexed by a provisional licence in the UK) provides the most promising stage in which to foster safer driving attitudes. This period marks the beginning of a trajectory of increasingly risky attitudes towards violations, at least
those involving speed. Variation in the amount and type of driver training received and the number of driving tests failed may have implications for individual differences in this trajectory. Interventions that could prevent this change may be particularly helpful, given that we found the attitudes of learners predicted future driving behaviour. Driving instructors and supervising adults may already be trying to develop safer attitudes in their pupils at this stage, and our data are not able to quantify this, or evaluate its effectiveness. While more recent models of driver education emphasise tuition regarding risky driving style as well as driving skills, it is possible that most UK training is too focussed on the control and higher order driving skills that will be formally assessed at the expense of developing safer driving attitudes. A focus on skills may contribute to the development of riskier attitudes as training control skills can lead to over-confidence. While interventions to improve driving behaviour often met with little success in the past, more recent theoretically-based approaches to improving driver risk taking have shown promise in small scale trials. Some approaches to skills training have also shown benefits for reducing riskiness. All of these approaches to attitude improvement may be best targeted during the learning phase as risk-taking behaviours may be more malleable before habits are formed during independent driving. It is also possible that education designed to improve attitudes during driver training may be most effective in the context of an integrated programme including pre-driving education. Further research must address this possibility.

Targeting attitudes during driver training also has some practical advantages. Attendance at attitude-training courses may become a formal requirement for licensing. Driving tests also offer the opportunity to select people for licencing based on their attitude. Implicit attitude measures, such as the Implicit Association Test may be useful here as they may be less vulnerable to faking than explicit tests.
ACKNOWLEDGEMENTS

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CONTRIBUTORSHIP STATEMENT

All authors made a substantial contribution to study conception and design, to data acquisition, to analysis and interpretation of data and to drafting and revising the article. All authors provided approval of the final version of the manuscript.
None of the authors have any competing interests.
REFERENCES


Table 1. Characteristics of the sample at Baseline and Follow-up.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>1596</td>
<td>1556</td>
</tr>
<tr>
<td>Age</td>
<td>Mode = 17 (range 14-23)</td>
<td>Mode=20 (range 18-27)</td>
</tr>
<tr>
<td>Sex</td>
<td>60% female</td>
<td>61.5% female</td>
</tr>
<tr>
<td>No licence</td>
<td>55%</td>
<td>13%</td>
</tr>
<tr>
<td>Provisional licence</td>
<td>26%</td>
<td>23%</td>
</tr>
<tr>
<td>Full licence</td>
<td>18%</td>
<td>64%</td>
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</table>
Table 2. Items included in the driving measures.

<table>
<thead>
<tr>
<th>Attitudes to Driving Violations Scale[14]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing the speed limit on motorways is a good idea</td>
</tr>
<tr>
<td>Even at night-time on quiet roads it is important to keep within the speed limit</td>
</tr>
<tr>
<td>Drivers who cause accidents by reckless driving should be banned from driving for life</td>
</tr>
<tr>
<td>People should drive slower than the speed limit when it is raining</td>
</tr>
<tr>
<td>Cars should never overtake on the inside lane even if a slow driver is blocking the outside lane</td>
</tr>
<tr>
<td>In towns where there are a lot of pedestrians the speed limit should be 20 miles per hour</td>
</tr>
<tr>
<td>Penalties for speeding should be more severe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Violations from the Driver Behaviour Questionnaire[18]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race away from traffic lights with the intention of beating the driver next to you</td>
</tr>
<tr>
<td>Overtake a slow driver on the inside</td>
</tr>
<tr>
<td>Disregard the speed limit on a motorway</td>
</tr>
<tr>
<td>Disregard the speed limit on a residential road</td>
</tr>
</tbody>
</table>
Table 3. Driving related measures: Distribution, sex differences and relationship with age and driving experience.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Male</th>
<th>Female</th>
<th>Sex²</th>
<th>Age³</th>
<th>Mileage³</th>
<th>Driving years³</th>
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<tr>
<td>ADVS</td>
<td>.20</td>
<td>3.45</td>
<td>19.63</td>
<td>17.65</td>
<td>.45***</td>
<td>0.09**</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>(4.60)</td>
<td>(4.09)</td>
<td>(.35, .56)</td>
<td>(.04, .14)</td>
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<td><strong>Follow-up</strong></td>
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<tr>
<td>ADVS²</td>
<td>.05</td>
<td>3.45</td>
<td>20.25</td>
<td>18.34</td>
<td>.43***</td>
<td>.05</td>
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<td></td>
<td>(4.52)</td>
<td>(4.23)</td>
<td>(.32, .54)</td>
<td>(-.00, .10)</td>
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<td>Follow-up: Fully Qualified Drivers Only</td>
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<td>20.93</td>
<td>19.27</td>
<td>.36***</td>
<td>-.05</td>
<td>.12**</td>
<td>.14*</td>
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<td>(3.98)</td>
<td>(.23, .50)</td>
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<td>(.05, .18)</td>
<td>(.03, .26)</td>
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<tr>
<td>DBQ</td>
<td>.78</td>
<td>3.33</td>
<td>1.50</td>
<td>1.10</td>
<td>.36***</td>
<td>-.16*</td>
<td>.24***</td>
<td>.24***</td>
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<tr>
<td>Violations</td>
<td>(.99)</td>
<td>(.84)</td>
<td>(.23, .50)</td>
<td>(-.27, -.06)</td>
<td>(.17, .31)</td>
<td>(.14, .34)</td>
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</table>

ADVS=Attitudes to Driving Violations Scale DBQ =Driver Behaviour Questionnaire

1Regression models predicting the driving variables from sex and age. Mileage and duration licence held were also included in models constrained to include only fully qualified drivers.

2 $b$ coefficient (and 95% confidence intervals) for male sex predicting standardised outcome variables.

3 $\beta$ coefficients (and 95% confidence intervals)

4Includes all participants irrespective of their licence status

*p<.05 **p<.01 ***p<.001
Table 4. Prediction of violations at follow-up from attitudes at baseline. Only participants with a full licence at follow-up were included in these analyses.

<table>
<thead>
<tr>
<th>Baseline licence status</th>
<th>N</th>
<th>Simple correlation</th>
<th>Regression β coefficient (95% Confidence Interval)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-drivers</td>
<td>319</td>
<td>.13*</td>
<td>.08 (-.06, .21)</td>
</tr>
<tr>
<td>Learners</td>
<td>232</td>
<td>.33**</td>
<td>.32** (.18, .45)</td>
</tr>
<tr>
<td>Fully-qualified drivers</td>
<td>224</td>
<td>.38**</td>
<td>.29** (.17, .41)</td>
</tr>
</tbody>
</table>

¹Model controls for age, sex and mileage.

* p<.05 ** p<.001
Figure Legends.

Figure 1. Mean attitudes to violations scores for participants with different forms of driving licence. Higher scores indicate riskier attitudes towards violations. Error bars show 95% confidence intervals.

Figure 2. Development of attitudes to driving violations in non-drivers at baseline, grouped by licence status at follow-up. Error bars show 95% confidence intervals.