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## **Young and unaffected by road policing strategies: Using deterrence theory to explain provisional drivers' (non)compliance**

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### **Abstract**

Newly licenced drivers are disproportionately represented in traffic injuries and crash statistics. Despite the implementation of countermeasures designed to improve safety, such as graduated driver licencing (GDL) schemes, many young drivers do not comply with road rules. This study used a reconceptualised deterrence theory framework to investigate young drivers' perceptions of the enforcement of road rules in general and those more specifically related to GDL. A total of 236 drivers aged 17-24 completed a questionnaire assessing their perceptions of various deterrence mechanisms (personal and vicarious) and their compliance with both GDL-specific and general road rules. Hierarchical multiple regressions conducted to explore non-compliant behaviour revealed that, contrary to theoretical expectations, neither personal nor vicarious punishment experiences affected compliance in the expected direction. Instead, the most influential factors contributing to non-compliance were licence type (P2) and, counterintuitively, having previously been exposed to enforcement. Parental enforcement was also significant in the prediction of transient rule violations, but not fixed rule violations or overall non-compliance. Findings are discussed in light of several possibilities, including an increase in violations due to more time spent on the road, an "emboldening effect" noted in prior studies, and possible conceptual constraints regarding the deterrence variables examined in this study.

### **Keywords**

Provisional drivers, young drivers, graduated driver licencing (GDL), compliance, deterrence theory

## Introduction

Graduated driver licensing (GDL) is a system designed to reduce the crash risk of newly licensed drivers by minimising exposure to risky driving circumstances (Bates, Allen, Armstrong, Watson, & King, 2014a, Foss, 2007; Williams, Chaudhary, Tefft, & Tison, 2010). This type of licencing system comprises three phases: 1) a learner phase, in which the novice driver gains practical driving experience under the supervision of a more experienced driver; 2) a provisional or intermediate phase, during which the driver can drive unsupervised but is subject to restrictions such as blood alcohol content (BAC) and the transportation of young passengers, and 3) a full licencing stage, acquired once the driver has held their provisional licence for the required period and, in some cases, passed additional tests (Bates et al., 2014a, Foss, 2007). Despite the GDL system having the best evidence base of all current novice driver countermeasures, many drivers in the provisional stage of their driving do not generally comply with road rules (Scott-Parker, Watson, King, & Hyde, 2012). In fact, research suggests that the further a driver progresses through the system, the less compliant they become (Allen, Murphy, & Bates, under review; Scott-Parker et al., 2012). Compliance may be even further influenced by factors such as pre-existing risky driving tendencies (Hartos, Eitel, & Simons-Morton, 2002), being male (McCartt, Shabanova, & Leaf, 2003) and younger age, both in general (McCartt, Mayhew, Braitman, Ferguson, & Simpson, 2009) and in terms of when first licenced (Hartos, Eitel, & Simons-Morton, 2001).

Deterrence theory is the most common framework used to guide the design and implementation of enforcement measures in the area of road safety (Bates, Soole, & Watson, 2012, Fleiter, Watson, & Lennon, 2013; Watling & Leal, 2012). Historically, road safety enforcement countermeasures have been based on the classical deterrence theory, which proposes that penalties must be perceived by the public as being certain, severe and swift in order to effectively encourage compliance with the law (Homel, 1988). Critiques regarding

the original model's conceptual limitations, however, have led to the incorporation of additional constructs to acknowledge the influence of past personal experiences of punishment avoidance, as well as punishment, along with indirect or vicarious experiences of these outcomes through interactions with others. According to Stafford and Warr's reconceptualised model of deterrence, there are four central deterrent mechanisms: 1) direct experience with punishment; 2) indirect experience with punishment; 3) direct experience with punishment avoidance, and; 4) indirect experience with punishment avoidance. Broadly, the expanded framework proposes that illegal behaviour is deterred via direct and indirect (vicarious) experiences of threat and punishment, but encouraged by direct and indirect experiences of punishment avoidance (Stafford & Warr, 1993). This revised framework has been applied across various areas of road policing research, with studies lending particularly strong support for the concept of punishment avoidance (Fleiter & Watson, 2006; Freeman & Watson, 2006; Gee Kee, Steinhardt, & Palk, 2007; Watson, 2004).

Despite considerable support for the empirical validity of the extended model, evidence for the deterrent impact of vicarious experiences has been limited and inconsistent. Firstly, vicarious experiences appear less influential among individuals well-versed in certain behaviours, whom are instead more influenced by personal, specific encounters as opposed to general deterrence mechanisms (Paternoster & Piquero, 1995). Secondly, though punishment experienced indirectly via non-significant others (e.g., other community members) can act as a deterrent, vicarious punishment avoidance is often only influential when it involves close acquaintances or well-known others, at least in the context of academic dishonesty and drink driving (Sitren & Applegate, 2006; 2007). Overall, the role of vicarious punishment has been unclear, with some research supporting it (Sitren & Applegate, 2006) and other studies questioning its impact (Sitren & Applegate, 2007) or finding that it inadvertently encourages intentions to offend (Piquero & Paternoster, 1998). More recent driving behaviour research

examining speeding (Fleiter & Watson, 2006), drink driving (Freeman & Watson, 2006), unlicensed driving (Watson, 2004) and hoon driving (Gee Kee et al., 2007) has either found no support for vicarious exposure to others' punishment or avoidance of punishment, or have found evidence that contradicts deterrence premises (Sitren & Applegate, 2012). Piquero and Pogarsky (2002) discuss these findings as resulting from a self-serving bias, in that vicarious punishment experiences may actually reinforce one's belief of being more accomplished than others at breaking the law and escaping detection. Collectively, these findings indicate that, contrary to theoretical predictions, indirect experiences do not have the same influence as direct experiences of punishment and punishment avoidance, at least in the area of driver behaviour.

Among teenagers, parental monitoring is also believed to encourage road rule compliance (Bates et al., 2014a). Given the role parents play in shaping and supporting novice drivers' behaviours, it is not surprising that higher levels of parental involvement, encouraging feedback and clear rule-breaking limits have been associated with less risky driving in young drivers (Taubman-Ben-Ari & Katz-Ben-Ami, 2012). In contrast, research has revealed links between limited parental monitoring or control and higher levels of risky driving (Hartos, Eitel, Haynie, & Simons-Morton, 2000; Hartos et al., 2002), violations (Hartos et al., 2000) and crash involvement (McCartt et al., 2003). Only one study has specifically examined the impact of parental enforcement on compliance in the context of deterrence theory, with the findings indicating that deterrence imparted by parents, but not police, significantly predicted novice drivers' compliance with road rules (Allen, Murphy, & Bates, under review). Some speculate that compared to police prosecution, younger drivers may be more susceptible to parental enforcement due to the internal sense of shame evoked by family disapproval (Allen et al., under review, Akers, 1994, Goodwin & Foss, 2004). As well as evoking shame, family disapproval may result in negative consequences for young

drivers, such as refusal of access to a vehicle. Arguably, such a consequence would be particularly influential among drivers who rely on their parents' vehicles, and may be shown to be even more influential than shame. These findings have important implications for the involvement of parents in encouraging young driver road rule compliance, although they need to be replicated to substantiate the value of parental enforcement as a deterrent.

A further issue associated with the GDL scheme is that drivers appear to become less compliant as they progress through the system. Scott-Parker et al. (2012) examined the driving behaviours and experiences of 343 novice drivers as they progressed from a learner phase to a provisional phase of driving. Using the Behaviour of Young Novice Drivers Scale (BYNDS) to measure illegal behaviour, the authors found that participants reported engaging in significantly more violations during the provisional phase compared to the learner phase, with such behaviours including more frequent illegal U-turns, drink driving, speeding, mobile phone use and passenger-vehicle capacity breaches. A similar trend was revealed in Allen et al. (under review) who found that more experienced provisionally licenced drivers (i.e., those in the second phase of their provisional driving [P2]) were characterised by greater non-compliant traffic history and less compliance with new road rules. As Allen and colleagues argue (under review), a likely explanation for these findings is that as experience increases, so too does driving exposure and thus a greater possibility of being detected for violations. Others note, however, that such behaviours may be largely related to the impact of parental attitudes and role modelling in the earlier licencing stages, given that unsupervised learner driving, speeding and avoiding punishment via parents' incurring repercussions have been associated with riskier driving practices in the provisional driving stage (Scott-Parker et al., 2012). Lower levels of compliance seen in later driving stages may therefore be more related to the absence of supervision than to age or experience, or due to a combination of these factors.

With novice drivers being overrepresented in traffic-related crash and injury statistics (Bates, Davey, Watson, King & Armstrong, 2014b; Elvik, 2010; World Health Organisation, 2007), it is critical that research identifies ways to further enhance the effectiveness of countermeasures such as the GDL. Such research must also consider the additional variables influencing novice drivers' behaviour, including age, gender, parental enforcement and the increased risk associated with progressing through the system. Queensland currently implements a three-stage GDL scheme (Bates, 2012), which has since undergone several modifications to enhance its safety benefits. In Queensland, a learner's license can be obtained at the age of 16 following the successful completion of a road law knowledge test (see Senserrick, 2009). After a period of 12 months (at a minimum age of 17), drivers are eligible to undertake a practical driving test enabling them to progress to the first (P1) of two provisional licensing stages. During the P1 stage the driver must maintain a BAC of 0.00%, and is unable to drive a high-powered vehicle, is prohibited from using a mobile phone whilst driving and is not allowed to carry more than one passenger less than 21 years of age at night. After having held a P1 license for at least 12 months and subsequently passing a hazard perception test (at a minimum age of 18), the driver is able to progress to the second provisional stage (P2). This phase lasts for a minimum of 24 months (prior to obtaining an open license) during which mobile phone and peer passenger restrictions are relaxed but BAC and high-powered vehicle requirements remain. At all GDL stages the driver is required to display visible "L" and "P" plates on the front and rear of their vehicle to indicate the licensing phase they are currently in.

Using an extended model of deterrence, the present study aimed to examine the relationship between young drivers' deterrence-related perceptions and their compliance with the GDL requirements. Specifically, it aimed to investigate the extent to which vicarious and personal (both formal and informal) deterrence mechanisms, along with other important

baseline variables, influence drivers' engagement in the very behaviours the GDL system aspires to curb.

## **Method**

### *Participants*

Participants were 236 male and female drivers aged 17-24 years, who held a Queensland provisional licence. Participants completed a 30 minute online survey regarding their compliance with GDL requirements and their perceptions relating to various deterrence measures. Participants were recruited through flyers, email lists used by the Queensland University of Technology (QUT) and the Institute for Health and Biomedical Innovation as well as the undergraduate psychology student research pool.

Prior to commencing the survey, participants were provided with information regarding the study on the initial screen of the survey. Completion and submission of the questionnaire indicated their consent to participating within the study. The study received approval from the QUT Human Research Ethics Committee (1300000542). The survey was open for completion between 11 October 2013 and 20 June 2014.

### *Measures*

*Socio-demographic data.* Participants were asked to indicate their age, gender, the type of provisional licence they held (P1 or P2), their highest level of education, employment status, whether they drove as part of their work, and the average amount of hours they drove per week.

*Non-compliance.* Non-compliance was measured using an adapted version of the Behaviour of Young Novice Drivers Scale (BYNDS; Scott-Parker, Watson, & King, 2010). The BYNDS is a 44-item, 5-factor scale designed to assess risky driving behaviour among provisional licence holders, with all items being scored on a 5-point Likert scale (e.g., "Whilst you have been driving on your provisional driver's licence, how often have you carried more passengers than could legally fit in your car?"; *never* [1] to *nearly all the time*



[5]). The 5-factor structure of the BYNDS has been validated in exploratory factor analyses based on both Australian and New Zealand young driver populations (Scott-Parker et al., 2010; Scott-Parker & Proffitt, 2014). Items were averaged consistent with the scale's five dimensions of risky driver behaviour: transient rule violations ( $\alpha = .90$ ); fixed rule violations ( $\alpha = .85$ ); misjudgement ( $\alpha = .80$ ); risky driving exposure ( $\alpha = .83$ ); and driver mood ( $\alpha = .83$ ). All subscales were included in preliminary *t* test analyses examining differences according to license type (P1 and P2). Given the breadth of risky driving behaviours measured by the BYNDS, however, only the two subscales most relevant to non-compliance (transient rule violations and fixed rule violations) were selected for regression analyses. An overall composite measure of non-compliance was also created, which displayed excellent internal reliability ( $\alpha = .94$ ).

*Vicarious Deterrent Experiences.* Vicarious deterrent experiences was measured using 9 items (following the removal of one item due to low scale reliability) that addressed young drivers' vicarious experiences of enforcement, punishment, and punishment avoidance (e.g., "The police catch other provisional drivers over and over again for committing traffic offences"; *strongly disagree* [1] to *strongly agree* [5]). Items regarding vicarious experiences of punishment avoidance (which theoretically encourage rather than discourage non-compliance) were reversed, and were subsequently combined with the items pertaining to vicarious experiences of enforcement and vicarious experiences of punishment items. The authors combined all vicarious experiences into the one composite scale due to the limited evidence available for the deterring impact of vicarious experiences in road behaviour research. Items were averaged to obtain an overall measure of perceived risk, which possessed reasonable internal reliability ( $\alpha = .66$ ).

*Formal and Informal Deterrence.* Formal deterrence was measured using various items that assessed drivers' perceived likelihood of being caught and punished for violating

road rules by the police. The scale was divided into the following subscales: *Personal exposure to enforcement* (4 items,  $\alpha = .79$ ; e.g., “The police catch me committing speeding offences in person”); *personal experiences with punishment* (4 items,  $\alpha = .83$ ; e.g., “The police punish me for texting on my mobile phone”), and; *personal experiences with punishment avoidance* (4 items,  $\alpha = .57$ ; e.g., “If I received a speed camera ticket, my parents would say that they were driving so that I was not punished”). Informal deterrence or *parental enforcement* was measured using 4 items ( $\alpha = .85$ ) assessing drivers’ perceived risk of being caught and punished for violating road rules by parents (e.g., “My parents have an important role in ensuring that I obey the road rules”). All items were scored on a 5-point Likert scale (*strongly disagree* [1] to *strongly agree* [5]), with some items negatively worded to reduce response bias.

#### *Statistical Analyses*

Independent *t* tests were conducted to ascertain whether differences existed between the type of driver (P1 versus P2) on all compliance and deterrence-related variables. Subsequently, a series of hierarchical multiple regressions were conducted to examine the influence of deterrence variables on the different types of road rule compliance (e.g., fixed rules), while controlling for demographic variables (e.g., age, licence type). We note that the inclusion of all variables, non-significant and significant, can inflate the total amount of variance explained in such analyses. However, for the purpose of this research we were primarily interested in demonstrating both significant and non-significant contributors to compliance (rather than overall variance explained). We also account for our comparatively small sample size relative to the number of variables analysed by reporting only adjusted statistical values ( $R^2$ ) in regression analyses.

## Results

### *Descriptive Results*

Participants were 236 young drivers [(167 females (70.8%) and 66 males (28%), with 3 participants failing to indicate their gender)], aged 17-24 years ( $M = 18.66$ ,  $SD = 1.55$ ), who held a Queensland provisional licence (P1 = 53.8%; P2 = 46.2%). The majority of the sample had achieved a grade 12 level of education (81.8%), with the remainder having completed apprenticeships, TAFE or Tech college degrees (8.5%) or university courses (9.7%). The large majority of participants were students (99%), most of whom were undertaking a psychology degree (89%). Most participants were employed (73.7%), with a small percentage (20.8%) indicating that they drove as part of their employment. On average, participants spent 6.2 hours per week driving a vehicle.

Table 1 presents the means, standard deviations and independent  $t$  test results for all compliance and deterrence-related variables, according to licence type (P1 or P2). With the exception of risky driving exposure (moderate for both groups of drivers), mean scores for the non-compliance subscales and the overall scale revealed that participants were generally compliant with road rules. Responses to the deterrence measures were variable but were generally indicative of a lack of concern about being apprehended, with the weakest deterrent emerging as personal experiences with enforcement. Parental enforcement was a strong deterring factor, irrespective of licence type.

Statistically significant mean differences were found between P1 and P2 drivers in relation to transient rule violations, risky driving exposure and driver mood. Compared to P1 drivers, drivers with P2 licences reported: more transient rule breaking behaviour (such as speeding); a greater exposure to risky driving situations (such as driving whilst tired), and; being more affected in their driving by mood (such as driving faster when in a bad mood). Overall, road rule compliance was significantly lower for P2 drivers. Additionally,

statistically significant mean differences were found between drivers regarding reported parental enforcement. Drivers with P1 licences reported their parents as influencing their compliance with road rules more than drivers with P2 licences.

Table 1.  
*Descriptive Statistics and Independent t Tests Means for Compliance and Deterrence Variables by Licence Type*

Variable	<i>M (SD)</i> P1 ( <i>n</i> = 127)	<i>M (SD)</i> P2 ( <i>n</i> = 109)	<i>t</i>	<i>df</i>
<b>Non-compliance (DV)</b>				
Transient Rule Violations	1.90 (.62)	2.36 (.69)	-5.35***	234
Fixed Rule Violations	1.14 (.37)	1.18 (.30)	-.84	234
Misjudgement	1.70 (.48)	1.78 (.48)	-1.28	234
Risky Driving Exposure	2.93 (.65)	3.28 (.63)	-4.19***	234
Driver Mood	2.07 (.82)	2.43 (.87)	-3.28**	234
Overall Compliance	1.91 (.43)	2.17 (.43)	-4.63***	234
<b>Deterrence (IV)</b>				
Personal Punishment	2.26 (1.02) <sup>1</sup>	2.47 (.94)	-1.65	233
Personal Enforcement	1.97 (.85)	2.15 (.78)	-1.63	234
Personal Avoidance	2.33 (.63) <sup>1</sup>	2.37 (.66)	-.56	233
Parental Enforcement	3.52 (.94)	3.23 (1.00)	2.29*	234
Vicarious Deterrent Exp.	3.26 (.58)	3.38 (.58)	-1.56	234

*Note:* <sup>1</sup> *n* = 126 (due to one missing case). Vicarious Deterrent Exp. = Vicarious Deterrent Experiences. Non-compliance was measured on a Likert scale of 1 (never) to 5 (nearly all the time), with higher scores indicating higher levels of reported violations. Deterrence variables were measured on a Likert scale of 1 (strongly disagree) to 5 (strongly disagree), with higher scores indicating stronger perceptions of deterrence.

\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

### *Regression Analyses*

A series of hierarchical multiple regressions were conducted to examine the influence of demographic and deterrence variables on young drivers' compliance with road rules (Tables 2-4). The overall BYNDS non-compliance scale and the two BYNDS subscales (transient rule violations, fixed rule violations) were the dependent variables. The demographic variables (age, gender, licence type, employment status, education and hours driven per week) and deterrence variables (personal experiences with punishment, personal exposure to enforcement, personal experiences with punishment avoidance, parental enforcement, and vicarious deterrent experiences) were the independent variables.

In each hierarchical regression, demographic factors were entered at step 1 as control variables, with the remaining independent variables entered at step 2. For the prediction of overall non-compliance (Table 2), the final model accounted for 11% of the variance, with licence type ( $\beta = .25, p < .001$ ) and personal exposure to enforcement ( $\beta = .22, p < .05$ ) emerging as significant independent predictors of compliance. Thus, having a P2 licence and having previously been exposed to enforcement predicted higher levels of non-compliance.

In the case of transient rule violations (Table 3), the final model accounted for 14% of the variance. Licence type ( $\beta = .30, p < .001$ ), personal exposure to enforcement ( $\beta = .20, p < .05$ ) and parental enforcement ( $\beta = -.13, p < .05$ ) emerged as independent predictors, while personal avoidance of punishment approached significance ( $\beta = .14, p = .05$ ). Thus, being a P2 driver, having less parental enforcement in place, and having been previously exposed to enforcement predicted higher levels of transient rule violations such as speeding and doing illegal U-turns. Personal avoidance of punishment for road rule violations was also influential in bolstering non-compliant behaviour, albeit not to a statistically significant degree.

In the case of fixed rule violations (Table 4), gender ( $\beta = -.14, p < .05$ ) and personal exposure to enforcement ( $\beta = .26, p < .01$ ) were statistically significant, with the final model accounting for 7% of the variance (although the combination of demographic variables, entered at step 1, did not contribute significantly to the model). Males and drivers with previous enforcement exposure were more likely to report fixed rule violations such as not wearing seatbelts or driving without a valid licence. The effect of interactions between licence type and age as well as licence type and hours of driving per week were checked in each model. However, the interactions were not significant in any of the models. Therefore, the simpler statistical analysis is presented.

Overall, the regression analyses offered explanation for the variance in all the three forms of non-compliance, although the variance accounted for in each case was quite low.

Table 2.  
*Hierarchical Multiple Regression Analyses Predicting Self-Reported Non-Compliance*

Variable	B	$\beta$	Adj. R <sup>2</sup>	F(df)
<b>Overall Compliance</b>				
Step 1				
Age	-.01	-.03		
Gender	-.01	-.01		
Licence Type	.23	.25***		
Employed	-.08	-.08		
Education	-.04	-.05		
Hours driving per week	.00	.04		
			.07	3.74 (6, 223)**
Step 2				
Personal Punishment	-.05	-.10		
Personal Enforcement	.12	.22*		
Personal Avoidance	.08	.12		
Parental Enforcement	-.05	-.11		
Vicarious Deterrent Exp.	.07	.10		
			.11	3.44 (11, 218)***

Note: Weights provided are those revealed in the final step of the analysis.

Vicarious Deterrent Exp. = Vicarious Deterrent Experiences.

\*\*\*  $p < .001$ . \*\*  $p < .01$  \*  $p < .05$

$\Delta R^2 = .06$  for step 2

Table 3.  
*Hierarchical Multiple Regression Analyses Predicting Self-Reported Transient Rule Violations*

Variable	B	$\beta$	Adj. R <sup>2</sup>	F(df)
<b>Transient Rule Violations</b>				
Step 1				
Age	-.02	-.05		
Gender	-.11	-.07		
Licence Type	.41	.30***		
Employed	-.10	-.06		
Education	-.08	-.07		
Hours driving per week	.01	.06		
			.10	5.37 (6, 223)***
Step 2				
Personal Punishment	-.07	-.11		
Personal Enforcement	.17	.20*		
Personal Avoidance	.14	.14 <sup>1</sup>		
Parental Enforcement	-.09	-.13*		
Vicarious Deterrent Exp.	.08	.07		
			.14	4.48 (11, 218)***

Note: Weights provided are those revealed in the final step of the analysis.

Vicarious Deterrent Exp. = Vicarious Deterrent Experiences.

\*\*\*  $p < .001$ . \*\*  $p < .01$  \*  $p < .05$

<sup>1</sup>  $p = .05$

$\Delta R^2 = .06$  for step 2

Table 4.

*Hierarchical Multiple Regression Analyses Predicting Self-Reported Fixed Rule Violations*

Variable	<i>B</i>	$\beta$	<i>Adj. R</i> <sup>2</sup>	<i>F(df)</i>
<b>Fixed Rule Violation</b>				
Step 1				
Age	.02	.11		
Gender	-.11	-.14*		
Licence Type	-.02	-.03		
Employed	.00	.00		
Education	-.03	-.05		
Hours driving per week	-.01	-.10		
			.03	1.98 (6, 223)
Step 2				
Personal Punishment	-.02	.05		
Personal Enforcement	.11	.26**		
Personal Avoidance	.04	.07		
Parental Enforcement	-.03	-.07		
Vicarious Deterrent Exp.	.03	.05		
			.07	2.52 (11, 218)**

*Note:* Weights provided are those revealed in the final step of the analysis.

Vicarious Deterrent Exp. = Vicarious Deterrent Experiences.

\*\*\*  $p < .001$ . \*\*  $p < .01$  \*  $p < .05$

$\Delta R^2 = .06$  for step 2

## Discussion

The purpose of this study was to examine the impact of young drivers' perceptions of current deterrence measures on their compliance with GDL requirements. It also aimed to examine whether, and to what extent, self-reported compliance was influenced by other important baseline variables including age, gender and licence type (P1 or P2).

Compared to P1 drivers, having a P2 licence significantly increased the likelihood of greater involvement in transient rule violations and overall non-compliant behaviour. These findings are not unlike those found in previous research, in which P2 drivers reported more breaches and a greater non-compliant traffic history than less experienced drivers (Allen et al., under review; Scott-Parker et al., 2012). As Allen et al. (under review) argue, P2 non-compliance may reflect a dose-response increase in violations due to increased time spent on the road and increased exposure to policing, rather than a weakening of compliant behaviour.

This is similar to the positive relationship between road exposure and crash frequency noted in the wider literature (Fridstrom, 2011). Whilst we controlled for driving exposure based on the number of hours participants' reported driving per week, we did not investigate the effects of exposure to policing, and such a focus is warranted in future research. It was also interesting to note that, compared to P2 drivers, P1 drivers were more affected by parental enforcement as a deterrent. Collectively, these findings suggest that parental involvement may be most critical and influential at the P1 licensing stage, after which parental enforcement becomes superseded by deterrents beyond the family environment. Similar to a separate study on novice drivers (Allen et al., under review), parental enforcement emerged as a significant contributing factor to young drivers' road rule compliance, albeit only in the case of transient rule violations; that is, risky behaviours undertaken during the journey (Scott-Parker et al., 2010). This suggests that parents may have some role in limiting novice drivers' rule-breaking behaviour that is more transient and spontaneous in nature, perhaps by encouraging or modelling a more consistent approach to safe driving.

The vicarious deterrent experiences construct did not appear to exert any deterring influence on drivers' engagement in specific (subscale) or overall non-compliant behaviour. In the current study, the vicarious deterrent experiences scale combined various items regarding a range of vicarious experiences including enforcement, punishment and punishment avoidance. The failure of these varying forms of vicarious experiences to predict future offences echoes prior studies indicating that drivers are generally unaffected by others' exposure to, or avoidance of, punishment (Fleiter & Watson, 2006; Gee Kee et al., 2007; Watson, 2004). More surprising was the finding that direct experiences were generally no more influential than indirect experiences of punishment, which stands in contrast to many previous road-related studies (e.g., Fleiter et al., 2013; Freeman & Watson, 2006). With the exception of personal punishment avoidance (which approached significance) and parental



enforcement influencing transient violations, the remaining direct deterrence measures did not significantly predicted non-compliance except for personal exposure to enforcement, which had the opposite effect to what would be predicted by deterrence theory.

Our findings indicated that greater exposure to enforcement predicted various levels of noncompliance. Specifically, it was found that drivers exposed to higher levels of enforcement for traffic and speeding offences were less compliant overall, and more likely to violate both transient and fixed rules. Similar findings have been reported in previous research indicating that, rather than serving as a deterrent, prior punishment experiences (albeit with regards to the construct certainty of punishment) paradoxically appears to encourage future offending (Fleiter and Watson, 2006; Piquero & Pogarsky, 2002). According to Piquero and Pogarsky (2002), this “emboldening” effect stems from the notion that individuals most committed to offending are more likely to be punished, and that punishment merely serves as a means of identifying such offenders. Moreover, the authors argue that because of this increased exposure to punishment, individuals apprehended more often are more likely to perceive punishment as likely based on their past experiences. Although past research has found this effect in relation to certainty of punishment (a classical deterrence theory construct) as opposed to exposure to enforcement (as in the present study), both encapsulate drivers’ perceived risk of being caught for engaging in illegal behaviours. Due to the similarities in the definitions of these constructs, it is plausible to assume that each may serve as a proxy for one another, with both gauging perceptions of prosecutions of some form.

Another explanation for enforcement predicting noncompliance is that drivers’ experience of enforcement was not as severe as anticipated, thus reducing its deterring impact on drivers’ compliance with road rules. Moreover, it is possible that items used to measure the construct did not adequately distinguish enforcement experiences from experiences in

which punishment was avoided. Since items enquired about drivers' encounters of being 'caught' for committing offences (e.g., "The police catch me committing traffic offences in person") but not necessarily reprimanded, the distinction between being caught versus punished may have been blurred for some participants. Regardless of these issues, previous studies indicate that offenders whose experience is primarily characterised by evading punishment may overlook penalties or view them as insignificant relative to their overall experience (Fleiter et al., 2013; Stafford & Warr, 1993). Accordingly, for some drivers, being caught and or punished for committing traffic offences may be ineffective in deterring non-compliant behaviour. Additionally, certain items (e.g., "The police catch other provisional drivers over and over again for committing traffic offences) may not have sufficiently distinguished between more general forms of deterrence that relate to all provisions drivers (i.e., the police catch many provisional drivers) versus only repeat offender drivers (i.e., the police catch the same driver multiple times). It is also noted that in the current study, the construct of personal exposure combined items relating to both traffic and speeding offences, and it is possible that each is associated with different levels of enforcement severity and perceived likelihood of punishment. Similar issues regarding the use of liberal versus highly specific definitions of deterrence constructs, along with fact that deterrence experiences are not mutually exclusive, have been highlighted previously (Piquero & Pogarsky, 2002).

Several hierarchical multiple regressions were conducted to predict overall non-compliance, as well as specific types of non-compliance among novice drivers. The models offered explanation for 7%-14% of the variance, with the greatest amount of variance being explained with regards to transient rule violations. The most prominent, consistent predictors throughout the analyses were personal exposure to enforcement and licence type. Particularly interesting was the difference between the predictions of transient versus fixed rule violations; though both were predicted by prior enforcement experiences, licence type was

only predictive of transient violations, while gender (being male) was only predictive of fixed rule violations. As Scott-Parker et al. (2010) argue, transient rule breaking constitutes behaviours that stem from risky decisions made whilst driving (e.g., speeding, overtaking a car on the left), versus decisions made prior to driving that effectively violate fixed rules (e.g., drink driving, carrying more passengers than legally allowed). As found in the current study, though P2 drivers were more likely to engage in transient rule-breaking behaviour, they were no more likely than P1 drivers to breach fixed rules including those which GDL systems aim to curb. These findings suggest that the key GDL restrictions are being adhered to by drivers across provisional driving stages, albeit less so amongst males, but that transient risk-taking behaviour increases with driving experience and may be opportunistic in nature. Further research is needed to investigate these findings and identify other potential processes that influence spontaneous risk-taking, such as sensation-seeking tendencies and the influence that other passengers may have on a novice drivers' decision-making process.

Despite the strong support that exists for the role of personal punishment avoidance in aberrant driving behaviours (e.g., Fleiter & Watson, 2006; Gee Kee, Steinhardt, & Palk, 2007; Watson, 2004), the construct did not appear to be overly influential in bolstering non-compliance in the current study. Personal punishment avoidance did, however, approach significance in the prediction of transient rule violations, but not fixed rule violations or overall non-compliance. As previously alluded to, fixed and transient rules differ in severity and the extent to which they apply specifically to provisional drivers. Consistent with the structure of the BYNDS (Scott-Parker et al., 2010), violations of transient rules generally concern illegal or risky behaviours that are common and non-specific to novice drivers (such as speeding and failing to keep left unless overtaking) whereas violations of fixed rules are both more serious in nature (e.g., drink driving and drug driving) and unique to provisional drivers (e.g., driving a high-powered vehicle). In the current study, both P1 and P2 drivers

reported engaging in more transient rule violations than fixed rule violations. Personal experiences with punishment avoidance may therefore be more applicable to transient rules than fixed rules, given the frequency with which drivers violate transient rules. As noted in previous research (e.g., Fleiter et al., 2013), this may also mean that drivers' perceive the chances of being caught for such violations as being insignificant relative to their overall history of transient rule violations.

It must be noted that, although the regression analyses offered explanation for the variance in all three types of non-compliance, the amount of variance explained was relatively low. There may therefore be many unaccounted for influences on non-compliant behaviour among novice drivers, which should be taken into consideration in future investigations.

The overall findings of this study suggest that current traffic law deterrence measures are largely ineffective in shaping novice drivers' compliance with road rules. As such, a review of current policing strategies and related sanctions for young drivers appears warranted, along with the consideration of alternative approaches to reducing offending behaviour of provisional drivers. One such consideration involves third party policing, which consists of police persuading non-offending parties such as parents, schools and health agencies to accept responsibility for preventing offending behaviour (Mazerolle & Ransley, 2005). As highlighted previously, parents as a third party may be most critical, while non-parental supervisors such as siblings and non-family members should also be considered due to their role in facilitating earlier stages of licensing (Bates, Watson, & King, 2014c). In the realm of emerging technologies, in-vehicle devices that monitor driving behaviour have also received attention in recent years. Although a more costly, invasive method to enhancing driver safety, this approach enables both novice drivers and their parents to discuss and learn from feedback provided by driver-monitoring technology (Guttman & Gesser-Edelsburg,

2011). Such approaches may serve as important adjuncts to deterrence theory, although more work is needed to determine their potential impact on compliance with road rules.

It is important to note that certain limitations should be taken into account when interpreting the results of the current study. Firstly, the study sample consisted predominantly of university students undertaking a course in psychology, and thus the generalizability of the findings beyond this cohort is limited. Secondly, despite all dependent variables yielding strong alpha coefficients ( $\alpha = >.80$ ), the reliability of several independent variables was questionable (the lowest of which was  $\alpha = .57$ ) and so too may be the overall reliability of our findings. Similarly, the relatively low amount of variance explained in the regression analyses must be noted, along with the possibility that many other unaccounted for factors may better explain, or enhance the explanation of, non-compliance. Finally, as mentioned previously, the definitions that comprised the study's deterrence constructs may have overlapped with, or failed to adequately capture, distinct deterrence mechanisms. This issue speaks to a broader problem in the literature concerning inconsistent and diffuse terminology to define deterrence elements, along with the established role of other influential factors that extend beyond classical and reconceptualised deterrence principles (Piquero & Pogarsky, 2002). Overall, whilst a more comprehensive approach to investigating offender behaviour appears favourable, these issues render it difficult to generalise deterrence findings across contexts.

In conclusion, this study suggests that, although current formal deterrence mechanisms do not appear to play a significant role in increasing newly licensed driver road rule compliance, there may be some role for deterrence imparted by parents. Results suggest that non-compliance, particularly transient rule breaking behaviour, can be expected to increase as a result of progressing through the GDL system (i.e., obtaining a P2 licence) and with differential exposure to enforcement and related experiences of punishment and punishment avoidance. By the same token, findings suggest that parental involvement at least

has impact on transient rule breaking and is more influential among P1 drivers. Parental enforcement may therefore prove an effective strategy in reducing young drivers' transient rule violations, particularly if parents become actively involved in shaping novice drivers' behaviours at the P1 licensing stage. It remains unclear, however, the reasons for which young drivers are deterred by their parents (e.g., whether due to shame and or repercussions that stem from non-compliance), and further work is needed to determine the value of parental enforcement as a deterrent. Whilst overall findings would appear to imply that a significant challenge exists for measures designed to enhance novice driver safety, it is crucial that findings are replicated and expanded on to better understand their implications for increasing compliance with traffic laws. Future research should also seek to explore the underpinnings of young drivers' deterrence-related perceptions, particularly with regards to why certain deterrence mechanisms have impact while others appear non influential among this group.

**Conflicts of Interest**

There are no competing interests to declare.

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