Exploring the Theoretical Underpinnings of Driving Whilst Influenced by Illicit

Substances

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Abstract

An increasing number of studies are highlighting the alarming proportion of motorists that drive after having consumed illicit drugs. However presently, little attention has focused on the factors that may facilitate drug driving from a criminogenic paradigm. This study evaluated the contribution of deterrence, defiance, and deviance theories on intentions to drug drive to determine factors that might facilitate or reduce this behaviour. A total of 922 individuals completed a questionnaire that assessed frequency of drug use and a variety of perceptions on deterrence, defiance, and deviance constructs. The analysis showed that the defiance constructs (i.e., experiencing feelings of shame and believing in the legitimacy of sanctioning authority) and the deviance constructs (i.e., moral attachment to the norm and having a criminal conviction) were predictive of drug driving intentions. The facets of deterrence theory were not found to be significant predictors. Ultimately, this study illustrates that a range of behavioural and perceptual factors have the capacity to influence decisions to drug drive. As a result, there appears the need to extend the focus of research endeavours beyond legal sanctions to examine other factors that may be utilised to both understand the aetiology of drug driving as well as increase the possibility of compliance with the corresponding legislation.

Keywords: Deterrence; Defiance; Deviance; Drug Driving; Substances abuse

1. Exploring the Theoretical Underpinnings of Driving Whilst Influenced by Illicit Substances

It has been well established that driving whilst influenced by illicit substances has a deleterious effect on driving performance as well as general road safety outcomes. More specifically, a mounting body of evidence is demonstrating a strong relationship between drug use and increased crash culpability (e.g., Drummer et al., 2003; Drummer et al., 2004). For example, between 22-40% of road fatalities and 10% of road injuries have been found to involve drugs other than alcohol (Poyser, Makkai, Norman, & Mills, 2002), with illicit substances dominating these figures (Schwilke, Sampaio dos Santos, & Logan, 2006). Despite this, a number of national and international studies continue to demonstrate that drug driving is a relatively prevalent behaviour among some driving cohorts (Darke, Kelly, & Ross, 2004; Davey, Davey, & Obst, 2005; A. W. Jones, 2005; Mura et al., 2006; Neale, 2004; Ojaniemi, Lintonen, Impinen, Lillsunde, & Ostamo, 2009).

In recognition of this increasing concern, government agencies are adopting legislation that makes it a criminal offence to drive a vehicle when influenced by an illicit substance/s (i.e., to drug drive). These laws now enable policing authorities to randomly test the oral fluids of motorist's for the presence of illicit substances. Specifically, oral fluid testing enables for the detection of the drug types of cannabis, methamphetamines, and cocaine substances (Drummer et al., 2007). Importantly, the development and refinement of oral fluid drug testing mechanisms has opened a new direction of policing methods and increases the likelihood of apprehending motorists who drive after consuming illicit substances (Walsh, de Gier, Christopherson, & Verstraete, 2004).

The objectives behind random roadside drug testing are twofold. First, there is the intention of sending a strong message about the dangers of drug driving; which can facilitate a deterrent effect (Schwilke et al., 2006). Second, roadside drug testing allows for increased detection and subsequent prosecution of drug driving offenders, which is aimed to reduce the risk of recidivism. In the current context, preliminary drug testing campaigns throughout Australia are seeking to emulate the successful methods of Random Breath Testing (RBT) which relies heavily on the principles of deterrence theory.

1.1 Deterrence Theory and Drug Driving

Deterrence theory has been utilised as a central mechanism of criminal justice policy (Zimring & Hawkins, 1973) and for traffic enforcement (Elvik & Christensen, 2007). The fundamental assumption of deterrence theory proposes that the perceived consequences of committing a prohibited activity will dissuade the individual from committing the activity (Homel, 1988). Within classical deterrence theory are the three elements of perceived certainty of apprehension, the severity of sanctions, and the swiftness of dispensation of sanctions. Specifically, it is proposed that an individual will be deterred from committing an offence when he/she perceives the certainty of punishment as high, the punishment as severe, and the administration of punishment as swift (Homel, 1988; Zimring & Hawkins, 1973).

Within classical deterrence theory there are two processes: specific and general deterrence. Specific deterrence operates at the individual level, deterring individuals via direct experiences of the legal sanctions. In contrast, general deterrence operates via the awareness and perceptions of legal sanctions for committing illegal acts that are held by the public. Moreover, general deterrence is reliant on mass media campaigns and highly visible enforcement practises. While

specific deterrence does contribute to the deterrent effect, general deterrence is considered to have the greatest widespread effect on traffic enforcement (Elvik & Vaa, 2004).

There exists preliminary evidence that suggests that random roadside drug testing has the potential to contribute to deterring drug drivers (Stevenson et al., 2001).   For example, Degenhardt, Dillon, Duff, and Ross (2006) found that some drug drivers have considered changing their drug driving behaviours since the initiation of roadside drug testing. Moreover, research shows that increasing perceptions of certainty of apprehension would lead to a reduction of drug driving among cannabis users (C. Jones, Donnelly, Swift, & Weatherburn, 2006). This last point is consistent with a large body of evidence that suggests that increasing the certainty of apprehension results in increasing the effectiveness of deterrence (Homel, 1988). In contrast, some research has suggested that increasing the severity of punishment would not be an effective deterrent for current drug drivers (C. Jones et al., 2006).

The previously mentioned findings of the inconsistent effects of certainty of apprehension and severity of sanctions are commonplace within the empirical arena of deterrence research. That is, certainty of apprehension should exert a greater effect followed by severity of sanctions in deterring illegal behaviours (Homel, 1988; Pratt, Cullen, Blevins, Daigle, & Madensen, 2006) however this has not always been the case. As a result, there has been a call from within the criminological discipline to consider other paradigms for the partial failure of legal sanctions to deter criminal activities (e.g., Akers, 1990; Sherman, 1993; Stafford & Warr, 1993; Tittle, 1995). Theoretical discourses that seek to elucidate the facilitation of criminal behaviour rather than the inhibition to criminal behaviour may offer further clarification for

individuals that drug drive. Two theoretical discourses that seem pertinent to the behaviour of drug driving are the theories of defiance and deviance.

1.2 Defiance and Drug Driving

The role of defiance may provide an improved account for the facilitation of consuming illicit substances and driving. For example, defiance may occur if an individual judges the penalties as unjust for the behaviour they are applied to (Sherman, 1993). It has been hypothesised that defiance is expressed by increased prevalence, frequency, or seriousness of the sanctioned behaviour by the individual, particularly when the sanctioned behaviour is considered malum prohibitum (Piquero & Pogarsky, 2002). As such, defiance theory stipulates that the interaction between the individual and the sanctioning organisation is of pre-eminent importance. Several authors have advanced and expanded the theoretical conception of defiance (e.g., Braithwaite, 1989; Scheff & Retzinger, 1991; Sherman, 1993; Tyler, 1990). Emerging from these extensions are three main facets of feelings of shame that may result from the apprehension, the perceived fairness of the incurred sanctions, and the perceived legitimacy of the sanctioning body.

1.2.1 Feelings of shame. The acceptance and acknowledgement of feelings of shame that an individual experiences having been caught for violating a law is a key feature for defiance theory (Braithwaite, 1989). The important aspect required for this process is that the shaming needs to be communicated within a sphere of respect for the individual (Braithwaite, 1989, 2000). In addition, there is the implicit understanding of the importance that emotions play in this process (Harris, Walgrave, & Braithwaite, 2004). Drug users and criminals social networks often sustain and support aberrant behaviours and provide a normative frame of reference for the individual drug user (Bisset, 2007) and thus it may be hypothesised that drug drivers

may experience very little shame for their illegal behaviour thereby promoting a defiant effect.

1.2.2 Perceived fairness of sanctions. Another important influence to the effectiveness of official sanctions is whether or not the individual perceives the sanctions to be fair. For instance, if a punished offender perceives the sanctions incurred as fair, the likelihood of admitting shame increases and subsequently compliance with the law increases (Sherman, 1993). However, when sanctions are perceived as unfair the individual is likely to exhibit a defiant reaction, which can result in increases of committing criminal activities (Sherman, 1993; Tyler, 1990).

It has been suggested that the perceived fairness of sanctions is a multifaceted and complex phenomenon. Factors such as the suitability of the applied penalties and whether the individual believed they were appropriately treated by the authorities when compared to others in the same position can influence how the individual perceives the fairness of the incurred sanctions. As such, the perceived fairness of sanctions involves a complex interaction between the individuals' beliefs and their experiences with the authorities. However, given the recent enactment of drug driving legislation, there is a paucity of research that has examined the relationship between drug driving sanctions and subsequent perceptions of fairness of such penalties.

1.2.3 Legitimacy of the sanctioning authority. The last main facet of defiance theory is the individual's belief of the legitimacy of the sanctioning authority. Research has shown that feelings of having been disrespected and stigmatised from a sanctioning authority for an illegal behaviour can facilitate additional criminal behaviours (Braithwaite, 2000). Moreover, this effect is augmented when the individual does not accept the legitimacy of the sanctioning authority (Harris et al., 2004). It has been suggested that when a sanctioning authority loses its legitimacy,

social sanctions are then elevated in importance (Tyler, 1990). However, drug users'

social networks can support such aberrant behaviours (Bisset, 2007; Hoffmann &

Yang, 2005) and thus negate any deterrent effect of sanctions.

It may yet be proven that the legitimacy of the sanctioning authority is likely

to be particularly diminished in the views of drug drivers. That is, studies have

demonstrated that some drug drivers believe that they can safely drive after

consuming illicit substances (e.g., Albery, Strang, Gossop, & Griffiths, 2000; Alvarez,

Fierro, & Del Rio, 2007; Davey, Davies, French, Williams, & Lang, 2005; Duff &

Rowland, 2006; Furr-Holden, Voas, Kelley-Baker, & Miller, 2006). This effect is

further exacerbated as experienced drug drivers believe they can reduce the associated

risks with compensatory strategies (Darke et al., 2004; Davey, Davies et al., 2005;

Davey, Williams, & Davies, 2001). All of these perceptions suggest there is a need to

examine whether perceptions of legitimacy and fairness impact on drug driving

practices.

1.3 Deviance Theory and Drug Driving

The final discourse that is particularly relevant to drug driving is that of

deviance theory. Deviance theory has been explored from a number of approaches,

including biological, psychological, and sociological paradigms. However, given the

previously discussed paradigms that are concerned with the perceptions of the

individual, the current study will utilise a psychological perspective. Specifically, a

paradigm that is concerned with divergence from what is considered the norm of

society will be utilised. Therefore, concepts such as respect for the law, moral

attachment to the norm, and occurrences of previous convictions are proposed to be

associated with perceptions of deviance.

1.3.1 Respect for the law. First, it has been shown that having respect for the law is related to decreased levels of criminal activity (Homel, 1988). In the current context, usage of drugs in itself is considered a deviant behaviour by the majority of societies members (Hammersley, 2008). Therefore, drug users may consider the application of drug laws to be considerably improper or of diminished value, possibly leading to diminished respect for drug laws. More specifically, drug users believe that they pose no threat for traffic safety and that the random road side drug testing is a waste of resources (Aitken, Kerger, & Crofts, 2000; McIntosh, O'Brien, & McKeganey, 2007). Such reports are indicative of a lack of respect for the law and lend support for the application of deviance theory to examine drug driving behaviour.

1.3.2 Moral attachment to the norm. Within the criminological literature, there exists a substantial amount of evidence that suggests increased moral attachment to the law creates diminished criminal propensity (Applegate, Cullen, & Fisher, 2002; Carmichael, Langton, Pendell, Reitzel, & Piquero, 2005; Matthews & Agnew, 2008; Mears, Ploeger, & Warr, 1998; Paternoster, 1989; Piquero & Paternoster, 1998; Silberman, 1976). For example, Silberman (1976) found that morality had a far larger negative relationship with delinquent behaviour than that of the deterrence factor of certainty of apprehension. Paternoster (1989) similarly found that greater levels of moral beliefs resulted in lowered likelihood of marijuana use. Moreover, lower levels of morality have been found to be highly predictive of drink driving (Freeman & Watson, 2009; Mears et al., 1998; Piquero & Tibbetts, 1996). As for drug driving, Davey et al. (2001) found that many drug users would drug drive in most circumstances and were not overly concerned about the risks involved. Such findings

suggest that illicit users may not be influenced with the moral implications of drug driving.

  1.3.3 Criminal convictions. A more robust finding in the criminogenic literature is that a marker of one's deviant predisposition can be accessed via an individuals' level of criminal activity (Braithwaite, 1989). Increased evidence of unlawful acts can serve as a proxy for a deviant personality and is likely to diminish the effectiveness of legal sanctions (Homel, 1988). For example, A. W. Jones (2005) found that in Sweden, zero-tolerance laws for drug driving had no effect for reducing the prevalence of drug driving and did nothing to deter the typical highly recidivist offender. Furthermore, many traffic offenders were criminally prone, with prior convictions for drink and or drug driving (A. W. Jones, 2005), showing a pattern of deviance amongst offenders.

1.4 Crime and Substance Abuse Issues

  It has been suggested that a number of factors can influence an individual's decision to commit an offence (Williams & Hawkins, 1986). Included in this list are issues of substances abuse, which has been identified as a substantial inhibitor of the effectiveness of sanctions (Yu, Evans, & Clark, 2006). Moreover, issues of substance abuse are particularly relevant pertaining to the behaviour of drug driving. For example, illicit drugs can produce a number of cognitive impairments (A. W. Jones, 2007; Logan, 1996; Ramaekers, Berghaus, van Laar, & Drummer, 2004) which would impact upon an individual's ability to reason and logically assess the dangers of drug driving. As such, it would seem prudent to assess and control for the individuals' levels of drug usage when assessing the perceptual constructs that may facilitate the likelihood of drug driving.

1.5 The Present Study

From a criminogenic perspective, a number of theoretical positions have postulated for the effectiveness (or ineffectiveness) of official sanctions. Given the infancy of drug driving research, little is known or understood about the factors that may facilitate or inhibit motorists from consuming illicit drugs before driving. Traditionally, research examining drug driving has focused on prevalence rates (e.g., Davey, Leal, & Freeman, 2007; Duff & Rowland, 2006), issues of impairment (e.g., A. W. Jones, 2007), enforcement issues (e.g., C. Jones et al., 2006; Watling, Palk, Freeman, & Davey, 2010), attitudes (e.g., Aitken et al., 2000; Terry & Wright, 2005), and accident culpability (e.g., Drummer et al., 2004; Longo, Hunter, Lokan, White, & White, 2000). A study by Freeman, Liossis, and David (2006) for which the current study is modelled on, investigated the criminogenic factors that influenced a group of recidivist drink drivers' self-reported offending behaviours. However, there is a dearth of research that has examined underlying motivations or possible facilitators of drug driving from a criminogenic perspective. Therefore, the present study seeks to evaluate the contributions of the facets of deterrence, defiance, and deviance theories to intentions to drug drive.

2. Method

2.1 Participants

In total, 922 individuals agreed to participate in the current study. The mean age of participants was 30.66 years (*SD* = 12.89; range = 16-81 years) with the ratio of males to females being approximately equal (males: 52%, females: 48%). Participants were comprised of university students and members of the general public. The majority of participants (80.3%) reported that they were employed.

2.2 Materials

To facilitate the collection of the data, a questionnaire was produced by the Centre for Accident Research and Road Safety-Queensland (CARRS-Q). The questionnaire was comprised of three sections: demographic section, drug usage section, and a perceptions and behaviours section. The demographic section collected participant's characteristics of age, gender, and employment status. The last part of the demographic section was the outcome measure of the individual's intentions to drug drive in the next six months. This measure of intentions to drug drive was scored from 0 to 182 indicating the maximum number of days an individual could drug drive in six months. The relationship between intentions to commit illegal behaviour and actual behaviour has been shown to be high ($r = .79-.83$) (Green, 1989; Kim & Hunter, 1993). Moreover, intentions to commit criminal offences has been utilised successfully in a number of criminogenic studies (Bachman, Paternoster, & Ward, 1992; Nagin & Paternoster, 1993; Tittle, 1980; Tittle, Ward, & Grasmick, 2003).

The participant's level of drug use was assessed via four items in the drug usage section. Each of the four questions queried the level of usage of cannabis, meth/amphetamine (ecstasy, speed, oil, base, and crystal), cocaine, and heroin. Participants indicated their most recent use of the drug via a Guttmen scale (i.e., within four hours, within the last 24 hours, within the last week, within the last month, within the last year, more than a year ago, have never used). To derive the variable of overall drug consumption, a score of seven through to one was assigned to the response of "within four hours" to the last possible response of "have never used" respectively, then the responses to the use of various drugs were then summated. The variable of overall drug use had a range of 4 to 28, with higher scores indicating greater use of drugs.

The final section of the questionnaire was the perceptions and behaviours sections. This section of the questionnaire assessed the constructs of deterrence, defiance, and deviance theories, in addition to the outcome measure of intentions to drug drive in the next six months. All items in this section of the questionnaire were measured via a 10-point Likert-scale (i.e., 1 'strongly disagree' to 10 'strongly agree'). Higher scores on all these measures reflect greater agreement by the individual.

The deterrence construct of certainty of apprehension was assessed via the item "The chances of presently getting caught for drug driving are high". The item "I think the penalties for drug driving would be quite lenient" assessed the severity of punishment. This item was a negatively worded item and was reversed scored for the analysis. Last, swiftness of punishment was assessed via the item of "If I was caught for drug driving by the police it would take a long time before I went to court and was penalised".

Defiance theory's theoretical constructs of feelings of same, perceived fairness of sanctions, and the feelings of the legitimacy of the government were assessed in the questionnaire. Feelings of shame was assessed by the item "I would be ashamed if caught for drug driving". The item "The penalties I would receive if I were caught drug driving would be fair" assessed the perceived fairness of sanctions. Last, the legitimacy of the sanctioning authority was assessed via one item being "I don't think the government has the right to tell me that I cannot take drugs before driving". This item was a negatively worded item and was reversed scored for the analysis.

The three outlined constructs of deviance theory were quantified by three items. Respect for the law was assessed by the item "I respect the law". The item "I personally believe that it is wrong to drive after taking drugs" assessed the deviance

construct of moral attachment to the norm. Last, whether an individual had a criminal conviction was assessed via the item "Have you ever been convicted of a criminal offence?". Unlike the previous variables, this item was scored as a categorical scale of yes or no.

2.3 Procedure and Design

Subsequent to ethical clearance from the Queensland University of Technology (QUT) research ethics committee, a snow-ball technique was utilised in the recruitment of participants. This system of recruiting participants relies on peer networks and referrals for the distribution of the questionnaire in addition to encouraging the general public to take part. The snow-balling technique was utilised in an attempt to maximise the number of illicit substance users in the shortest possible time. That is, it was anticipated that drug users that completed the questionnaire would then encourage their drug using friends to also participate in the study.

Researchers distributed the questionnaires to university students on a number of campuses, patrons at shopping centres, and spectators at sporting events. Participants were an information sheet to peruse, which explained the purpose of the research and the procedure to ensure confidentiality and anonymity of responses, given the sensitive nature of the data being collected (i.e., illegal behaviours). Upon agreeing to take part in the study, participants were given a consent form to sign and the questionnaire to complete. All instructions given to participants were standardised. Last, it must be noted that participation in the study was voluntary and withdrawal was permitted at any time, without questioning.

It was discovered that the outcome variable breached the assumptions of normality and could not be corrected with even the most extreme transformation. Additionally, the variables of overall drug consumption, certainty of apprehension,

swiftness of punishment, legitimacy of sanctioning authority, respect for the law, moral attachment to the norm had minor breaches of normality. As such, the non-parametric correlation of Kendal's Tau (τ) was utilised to reduce the influence of distribution irregularities. Additionally, due to the issues with normality, a logistic regression was utilised to determine the predictors of intentions to drug drive in the next six months. Therefore, the outcome variable was changed to a dichotomous variable for the logistic regression analysis to those who would and would not drug drive in the future.

<div align="center">3. Results</div>

3.1 Levels of Drug Usage

First, an examination of the samples self-reported drug usage revealed that well over half of the sample had used one of the four drugs at least once in their lifetime (n = 550; 59.7%). As shown in Table 1, the most prevalently consumed drug was cannabis followed by meth/amphetamine type substances, cocaine, and heroin. Moreover, cannabis was the most frequently used drug with 18.9% of the sample consuming cannabis within the last month or at even greater levels of consumption. In contrast, meth/amphetamine type substances, cocaine, and heroin were all consumed within the last month or greater levels by 8.2%, 2.2%, and .7% of the sample respectively.

Table 1

The Percentage of Self-reported Use of an Illicit Substance by Participants

| | Type of illicit substance | | | | | | | |
| | Cannabis | | MATS | | Cocaine | | Heroin | |
Frequency of drug use	*n*	%	*n*	%	*n*	%	*n*	%
Have never used	386	(41.9)	645	(70.0)	764	(82.9)	876	(95.0)
More than a year ago	259	(28.1)	115	(12.5)	87	(9.4)	37	(4.0)
Within the last year	102	(11.1)	86	(9.3)	50	(5.4)	2	(.2)
Within the last month	63	(6.8)	40	(4.3)	12	(1.3)	1	(.1)
Within the last week	46	(5.0)	25	(2.7)	5	(.5)	3	(.3)
Within the last 24 hours	39	(4.2)	7	(.8)	2	(.2)	1	(.1)
Within the last 4 hours	27	(2.9)	4	(.4)	2	(.2)	2	(.2)

Note: MATS = meth/amphetamine type substances

3.2 Descriptive Statistics

The means and standard deviations of the samples' perceptions of deterrence, defiance, and deviance constructs are shown in Table 2. Regarding the deterrence constructs, it can bee seen that the sample was somewhat ambivalent regarding their perceptions of the certainty of apprehension as well as the swiftness of punishment. That is, the mean responses of these two constructs fell close to the midpoint of the range of scores. In contrast, the sample perception of the severity of punishment was that they generally believed that the penalties for drug driving would be moderately severe.

The defiance theory constructs mean scores were quite disparate to the deterrence scores, with all of the defiance constructs being well above the midpoint for the range of scores. The sample reported that they would be moderately shameful of having been caught for drug driving and they would perceive the sanctions for drug driving as fair. Moreover, the sample believed that the government legitimately was apt in determining the laws for drug driving.

Regarding the samples' perceptions pertaining to the deviance constructs, the mean score for respect for the law indicated that there was a large amount of respect for the current laws concerning drug driving. Additionally, the sample exhibited a large degree of moral attachment to the norm. That is, there was a large agreement with the sentiment that taking drugs and driving was wrong. Moreover, it was found that 11.1% of the sample reported that they had a criminal record. Pertaining to the samples intentions to drug drive in the next six months, it was found that on the whole, the sample would drug drive only a small amount ($M = 7.36$; $SD = 28.57$). That is, on average the sample would drug drive for approximately seven days out of the next 182 days. Last, it must be noted that there was a large degree of variance with this variable, indicating that many individuals would drug drive a moderate amount and then others would not drug drive at all.

Table 2

The Means and Standard Deviations (SD) of the Deterrence, Defiance, and Deviance Variables

Construct	Mean	SD
Overall drug usage	6.27	3.15
Deterrence Theory		
Certainty	4.42	2.37
Severity	6.87	2.62
Swiftness	4.97	2.41
Defiance Theory		
Feelings of shame	6.25	3.14
Fairness of sanctions	6.29	2.53
Legitimacy of sanctioning authority	8.47	2.53
Deviance Theory		
Respect for the law	7.84	2.41
Moral attachment to the norm	8.23	2.71
Intentions to drug drive in the next six months	7.36	28.57

Note. All variables have a range of 1-10, except for overall drug usage (4-28) and intentions to drug drive in the next six months (0-182).

3.3 Bivariate Correlations between Deterrence, Defiance, and Deviance Constructs

and the Propensity to Drug Drive

The bivariate correlations of the study variables are shown in Table 3. Regarding deterrence theory, only certainty of apprehension was a significant correlate with intentions to drug drive ($\tau = -.17$, $p < .001$), though it was small in magnitude. In contrast, all of the defiance constructs were significantly correlated with intentions to drug drive. Of note was the negative and moderate correlation between the feelings of shame variable and intentions to drug drive ($\tau = -.37$, $p < .001$), as well as the negative correlation between legitimacy of the sanctioning authority and intentions to drug drive ($\tau = -.36$, $p < .001$). In relation to the deviance constructs that were correlated with intentions to drug drive, respect for the norm ($\tau = -.29$, $p < .001$) and moral attachment to the norm ($\tau = -.47$, $p < .01$) were both significantly negatively correlated.

It must be noted that there was a number of significant correlations. However, given the large sample size only meaningful correlations should be interpreted as the minor relationships are only significant from a statistical point of view. However, the largest correlation found was that of overall dug consumption and intentions to drug drive ($\tau = .49$, $p < .001$). As such, given the cited literature and the size of the bivarate correlation the inclusion of this measure as a control variable seems validated.

Table 3

Bivariate Correlations between Deterrence, Defiance, and Deviance Variables and Intentions to Drug Drive

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (male)	-	-.05	-.09*	.2**	-.07*	.005	.001	-.25**	-.07*	-.15**	-.25**	-.27**	.22**	.24**
2. Age		-	.09**	-.07**	.03	-.06*	-.03	-.005	-.04	.03	.13**	.07**	.04	-.03
3. Employment status (no)			-	-.09**	.03	-.07*	.05	.05	.04	.02	.05	.06*	-.05	-.09**
4. Overall drug consumption				-	-.11**	.07**	-.08**	-.28**	-.06*	-.26**	-.33**	-.4**	.28**	.49**
5. Certainty					-	.08**	-.12**	.19**	.09**	.06*	.08**	.12**	-.07*	-.17**
6. Severity						-	-.32**	.06*	.12**	.09**	.007	-.04	-.03	-.005
7. Swiftness							-	-.05*	-.07**	-.04	.002	.06*	.02	-.02
8. Feelings of shame								-	.17**	.27**	.29**	.38**	-.22**	-.37**
9. Perceived fairness of sanctions									-	.19**	.21**	.18**	-.09**	-.11**
10. Legitimacy of sanctioning authority										-	.34**	.45**	-.22**	-.36**
11. Respect for the law											-	.45**	-.24**	-.29**
12. Moral attachment to the norm												-	-.23**	-.47**
13. Criminal record (yes)													-	.32**
14. Intentions to drug drive in the next 6 months														-

3.4 Predictors of Intentions to Drug Drive

In order to determine which constructs were predictive of intentions to drug drive a series of logistic regression analyses were undertaken. The first step included the demographic variables (i.e., gender, age, and employment status) and was a significant predictor of the outcome variable ($\chi^2(1, 3) = 70.23$, $p < .001$). These variables accounted for 12.2% of the variance and correctly classified 82.9% of the sample. However, it must be noted that the Hosmer and Lemeshow test was significant ($\chi^2(1, 8) = 21.92$, $p < .05$) and indicates that the classification accuracy was inadequate utilising the demographic variables alone. Nonetheless, the variables of gender (OR = 4.03, $p < .001$) and age (OR = .98, $p < .05$) were significant predictors. Table 4 displays the regression coefficients, Wald statistics, odds ratios (OR), and 95% confidence intervals for the OR.

In order to control for the influence of overall drug consumption, this variable was added into the second step of the logistic regression and was a significant predictor of the outcome variable ($\chi^2(1, 4) = 370.53$, $p < .001$). A total of 55.2% of the variance of intentions to drug drive in the future was accounted for by these variables, and increase of 43%. The Hosmer and Lemeshow test was non-significant ($\chi^2(1, 8) = 6.14$, $p > .05$) indicating adequate classification accuracy, with 90.2% of the sample correctly classified. The variable of overall drug consumption was a significant predictor of intentions of drug driving (OR = 1.82, $p < .001$). That is, the greater the individual's consumption levels of illicit substances, the more likely they were to have intentions to drug drive again in the future. Last, only gender remained a significant predictor of intentions to drug drive (OR = 2.6, $p < .001$).

Table 4

Demographic, Deterrence, Defiance, and Deviance Variables Logistic Regression

Co-efficients for Intentions to Drug Drive in the next six Months.

Study variables	B	S.E.	Wald	OR	95% Confidence interval for OR	
					Lower	Upper
Model 1						
Gender (male)	1.39	.21	44.85**	4.03	2.68	6.01
Age	-.02	.009	7.36*	.98	.96	.99
Employment status (no)	-.5	.27	3.51	.6	.36	1.02
Constant	-1.69	.31	30.53**	.11		
Model 2						
Gender (male)	.96	.26	13.25**	2.6	1.56	4.36
Age	-.001	.01	.01	1	.98	1.03
Employment status (no)	-.68	.36	3.65	.51	.25	1.02
Overall drug consumption	.6	.05	164.77**	1.82	1.66	1.99
Constant	-6.5	.59	120.34**	.002		
Model 3						
Gender (male)	.22	.3	.56	1.25	.7	2.25
Age	-.003	.02	.05	.99	.97	1.03
Employment status (no)	-.75	.41	3.37	.48	.21	1.05
Overall drug consumption	.49	.05	90.44**	1.63	1.48	1.81
Deterrence Theory						
Certainty	-.05	.06	.55	.95	.84	1.08
Severity	-.01	.06	.04	.99	.88	1.12
Swiftness	-.008	.06	.02	.99	.88	1.12
Defiance Theory						
Feelings of shame	-.23	.05	18.42**	.79	.71	.88
Fairness of sanctions	.02	.06	.11	1.02	.91	1.14
Legitimacy of sanctioning authority	-.13	.05	6.51*	.88	.8	.97
Deviance Theory						
Respect for the law	.05	.07	.69	1.06	.93	1.2
Morals attachment to the norm	-.2	.05	15.11**	.82	.74	.91
Criminal record (yes)	.68	.35	3.91*	1.98	1.01	3.89
Constant	-1.83	1.11	2.73	.16		

OR = odds ratio.
Note: *$p < .05$, **$p < .001$.

The third step of the logistic regression included the deterrence, defiance, and

deviance constructs. The inclusion of these variables was also a significant predictor

of the outcome variable (χ^2(1, 13) = 455.26, p < .001). A total of 65% of the variance was accounted for by these variables, an increase of 9.8% from the second step. In addition, this set of variables correctly classified 91.6% of the samples' intentions to drug drive in the next six months, with the Hosmer and Lemeshow test being non-significant (χ^2(1, 8) = 7.58, p > .05).

Specifically, it was found that none of the deterrence variables were significant predictors of the outcome variable. In contrast and regarding the defiance variables, feelings of shame was found to be a significant predictor (OR = .79, p < .001). That is, the greater the feelings of shame the individual felt the less likely they were to intend to drug drive again. Similarly, the variable of legitimacy of the sanctioning authority was a significant predictor (OR = .88, p < .05), as the more an individual believed in the legitimacy of the sanctioning authority the less likely they were to intend to drug drive in the future. The defiance variable of perceived fairness of sanctions was not found to be a significant predictor. Pertaining to the deviance variables, having respect for the law was also not found to be a significant predictor. In contrast, moral attachment to the norm was a significant predictor (OR = .82, p < .001). Additionally, having a criminal record was a significant predictor of intentions to drug drive (OR = 1.98, p < .05). None of the demographic variables were found to significant with the inclusion of the deterrence, defiance, and deviance variables. Last, it must be noted that overall drug consumption remained a significant predictor (OR = 1.63, p < .001) when all the variables were entered collectively in the model.

4. Discussion

The intention of the current study was to examine the relative contribution that the theories of deterrence, defiance, and deviance had for predicting the samples' intentions to drug drive in the future, after controlling for overall drug consumption

levels. It was discovered that a range of factors were found to be predictive of future intentions to drug drive which are discussed below.

4.1 Deterrence Theory

The logistic regression analyses showed that neither certainty, severity, nor swiftness were significantly predictive of intentions to drug drive. This finding is quite concerning given the reliance of traffic enforcement on the principles of deterrence. Though, it must be noted that the direction of the non-significant relationship between certainty and intentions to drug drive was negative and thus individuals with greater perceptions of certainty of apprehension were less likely to report having intentions to drug drive.

There are several reasons why traffic authorities should remain optimistic regarding the effectiveness of random oral drug testing to deter drug drivers. The drug testing campaign currently in effect in Queensland is relatively new. That is, the legislation was only passed in December 2007 and the actual testing campaign has yet to move into full force. In addition, for many years drug drivers have known that there was no way of testing them objectively for the presence of illicit substances in their system (Darke et al., 2004; Davey et al., 2001) which is likely to have a residual effect. As such, conceiving the current situation of drug driving utilising Homel's (1986) "Hole in the Bucket Model", the hole at the bottom of the random drug testing bucket has started out quite large! Taken together, the non-significant findings of the deterrence variables may be counteracted utilising lessons learnt from RBT campaigns in the way of sustained policing efforts that are highly visible to motorists.

4.2 Defiance Theory

The reviewed literature that has investigated the attitudes of drug drivers suggested that defiance theory may be pertinent to the situation of drug driving. In the

current study, it was found that the variables of feelings of shame and legitimacy of the sanctioning authority were significant predictors of intentions to drug drive. More specifically, decreases in both reported feelings of shame and in the legitimacy of the sanctioning authority resulted in an increased likelihood of drug driving, although it is noted that feelings of shame was the more influential of the two predictors.

The finding that feelings of shame acted as an inhibitor to drug driving is congruent with a number of studies. For instance, Grasmick and Bursik (1990) found that feelings of shame for drink driving had a greater effect than that of the legal sanctions. Additionally, a bivariate relationship existed between feelings of shame and the perceived fairness of sanctions. This relationship was small in magnitude but nonetheless is consistent with theory. That is, an individual that perceives the legal sanctions as fair would then experience justified feelings of shame (Braithwaite, 1989; Murphy & Harris, 2007). Moreover, justified feelings of shame can lead to the acceptance of the legitimacy of the sanctioning authority (Braithwaite, 1989; Scheff & Retzinger, 1991). Congruent with this premise was the current study's findings of a positive and moderate correlation between feelings of shame and the legitimacy of the sanctioning authority.

It must be noted that perceived fairness of sanctions was not a significant predictor of intentions to drug drive. Moreover, of the defiance variables, perceived fairness of sanctions had the smallest bivariate correlation with intentions to drug drive. However, this finding may reflect the fact that the sample had not yet been apprehended and punished for drug driving, and thus, any perceptions of the perceived fairness of sanctions would be hypothetical. Nonetheless, with two of the three defiance variables being predictive of intentions to drug drive, the current study seems to identify that some individuals will offend regardless of the legal sanctions.

For example, some drug drivers reveal that they are not concerned about the risks inherent with drug driving (McIntosh et al., 2007). In addition, some drug users believe that their driving ability actually improves when influenced by illicit substances (Aitken et al., 2000; Lenné, Fry, Dietze, & Rumbold, 2001). As such, these perceptions of drug drivers seem to justify the instigation to random oral drug testing.

4.3 Deviance Theory

The last of the three theories considered to be pertinent to the behaviour of drug driving was that of deviance theory. Deviance theory was defined by variables of respect for the law, moral attachment to the norm, and having criminal convictions. The variable of respect for the law was found to be a non-significant predictor of intentions to drug drive. Nonetheless, a significant and positive bivariate relationship was found between respect for the law and intentions to drug drive that was moderate in magnitude. Additionally, respect for the law was positively correlated with moral attachment to the norm.

In contrast, the variable of moral attachment to the norm was found to be a significant predictor of intentions to drug drive. The current study's findings are congruent with a plethora of studies that have shown that increased moral attachment to the law is related to diminish criminal propensity (Applegate et al., 2002; Carmichael et al., 2005; Matthews & Agnew, 2008; Mears et al., 1998; Paternoster, 1989; Piquero & Paternoster, 1998; Silberman, 1976). The functioning of moral action has been described as being regulated by social sanction and internalised self-sanctions (Bandura, 1991). The experiencing of social sanctions is an important facet to consider (e.g., Homel, 1988; Williams & Hawkins, 1986) yet it is the case that internalised self-sanctions are ubiquitously in operation (Bandura, 1991). The current

study found the defiance variables of feelings of shame and legitimacy of sanctioning authority were similarity facilitative of intentions to drug drive and also had moderate correlations with the deviance variable of morals towards the norm. Taken together, it is possible that that the internalised self-sanctions of drug drivers are less influential for drug drivers in this sample.

Individuals that had a criminal record were similarly more likely to have intentions to drug drive. Having prior criminal convictions has also been found to be consistently related to instances of drink driving (Freeman, Liossis, Schonfeld et al., 2006; Grasmick & Bursik, 1990) and for drug driving (A. W. Jones, 2005; Neale, 2004). For instance, individuals who have a higher criminal propensity have been shown to be more likely to engage in precarious traffic behaviour (Junger, West, & Timman, 2001). In addition, in Sweden, zero-tolerance laws for drug driving had no effect for reducing the prevalence of drug driving amongst the highly criminally prone offender (A. W. Jones, 2005). Last, increased levels of drug consumption were found to have moderate and negative correlations with respect for the law and moral attachment to the norm, indicating a further pattern of deviance.

4.4 Overall Drug Use Issues

It was found that the variable of overall drug consumption was a strong predictor of intentions to drug drive which accounted for over half of the variance. That is, the more drug use the individual reported the more likely they were to drug drive. In addition, overall drug use had the largest bivariate relationship with intentions to drug drive. The obtained findings are congruent with a number of studies reporting that individuals who engage in greater usage of drugs are more likely to report favourable attitudes towards drug driving and partake in this behaviour in greater frequency (Duff & Rowland, 2006; Furr-Holden et al., 2006). Moreover, many

studies have described of the relationship between substance abuse or dependence and the subsequent strong link with offending behaviours (Freeman, Liossis, Schonfeld et al., 2006; Hammersley, 2008; A. W. Jones, 2005; Lo, 2004).Taken together, an individual's level of drug use is a central factor in determining an individual's amount of drug driving.

Importantly, the addition of the deterrence, defiance, and deviance variables into the logistic regression resulted in overall drug consumption remaining a strong predictor of intentions to drug drive, with several of the defiance and deviance variables being significant predictors as well. However, it must be noted that issues of substance abuse has been established to substantially impede the effectiveness of legal sanctions (Freeman, Liossis, Schonfeld et al., 2006; Yu et al., 2006). Consistent with this position was that the deterrence variables of certainty, severity, and swiftness of punishment did not greatly influence intentions to offend within the current sample. Although, it is noted that the variable of certainty of apprehension had a significant and negative bivariate correlation with overall drug use. Taken together, an outcome of the current study seems to identify that increased drug usage degrades the effectiveness of legal sanctions.

The issue of high levels of drug use and its effect for legal sanctions is particularly concerning when considering the importance of the defiance and deviance constructs. That is, individuals reporting high levels of drug use also reported higher agreement on the defiance and deviance items would seem to suggest that drug driving is a way of life for some drug users. For instances, when drugs are obtained they are frequently consumed inside the motor vehicle (Australian Institute of Health and Welfare, 2004, 2007). Even more concerning is the perceptions of heavy drug users that their driving abilities actually improves when influenced by illicit

substances (Aitken et al., 2000; Lenné et al., 2001) despite empirical evidence that suggests otherwise. Therefore, the importance of random oral drug testing to apprehend such individuals can not be overstated.

4.5 Limitations and Future Research

A limitation that must be bore in mind when considering the findings was the use of self-report measures. Moreover, given the sensitive nature of the data being collected (i.e., illegal behaviours) the obtained results could possibly be susceptible to self-reporting bias. Additionally, the participants were not randomly selected for the study and issues of self-selection may be pertinent. Last, the psychometric properties (i.e., reliability and validity) of the scale utilised for the study needs evaluating. Given the obtained findings, suggestions for future research include the application of a more extensive model of defiance and deviance to the behaviour of drug driving. Such an undertaking can provide directions and strategies for the utilisation of drug referral programs.

4.6 Conclusion

This study sought to evaluate the contribution of deterrence, defiance, and deviance theories for the facilitation of drug driving. Additionally, this study contributed to the paucity of studies that has investigated the facilitation of drug driving from a criminogenic paradigm. The results show that the defiance and deviance constructs were important predictors of facilitating intentions to drug drive, which highlights the complexity of the offending behaviour. However, the deterrence theory facets of certainty, severity, and swiftness of punishment were not predictive. In addition, greater levels of drug use were predictive of increased intentions to drug drive. Traffic enforcement is heavily reliant on the principles of deterrence and should remain the case. However, given the importance of defiance and deviance constructs

in the facilitation of intentions to drug drive, there appears the need to venture beyond legal sanctions to increase the possibility of compliance with drug driving legislation amongst drug drivers. Such an undertaking could focus on defiant and deviant predispositions in mass media campaigns or in drug diversion counselling programs for convicted offenders. These endeavours can eventually reduce the burden of harm associated with traffic crashes involving illicit substances and lead to safer motoring environments for all road users.

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References

Aitken, C., Kerger, M., & Crofts, N. (2000). Drivers who use illicit drugs: Behaviour and perceived risks. *Drugs: Education, Prevention and Policy, 7*, 39-50.

Akers, R. L. (1990). Rational choice, deterrence, and social learning theory in criminology: The path not taken. *The Journal of Criminal Law and Criminology, 81*, 653-676.

Albery, I. P., Strang, J., Gossop, M., & Griffiths, P. (2000). Illicit drugs and driving: Prevalence, beliefs and accident involvement among a cohort of current out-of-treatment drug users. *Drug and Alcohol Dependence, 58*, 197-204.

Alvarez, F. J., Fierro, I., & Del Rio, M. C. (2007). Cannabis and driving: Results from a general population survey. *Forensic Science International, 170*, 111-116.

Applegate, B. K., Cullen, F. T., & Fisher, B. S. (2002). Public views toward crime and correctional policies: Is there a gender gap? *Journal of Criminal Justice, 30*(2), 89-100.

Australian Institute of Health and Welfare. (2004). *National drug strategy household survey: Detailed findings* (No. PHE 66). Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2007). *National drug strategy household survey: Detailed findings* (No. PHE 107). Canberra: Australian Institute of Health and Welfare.

Bachman, R., Paternoster, R., & Ward, S. (1992). The Rationality of Sexual Offending: Testing a Deterrence/Rational Choice Conception of Sexual Assault. *Law & Society Review, 26*(2), 343-372.

Bandura, A. (1991). Social cognitive theory of moral thought and action. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Handbook of moral behavior and development* (Vol. 1, pp. 45-103). Hillsdale, NJ: Erlbaum.

Bisset, S. (2007). School culture as an influencing factor on youth substance use. *Journal of Epidemiology & Community Health, 61*, 485-490.

Braithwaite, J. (1989). *Crime, Shame and Reintegration*. Cambridge: Cambridge University Press.

Braithwaite, J. (2000). Shame and criminal justice. *Canadian Journal of Criminology, 42*(3), 281-298.

Carmichael, S., Langton, L., Pendell, G., Reitzel, J. D., & Piquero, A. R. (2005). Do the experiential and deterrent effect operate differently across gender? *Journal of Criminal Justice, 33*, 267-276.

Darke, S., Kelly, E., & Ross, J. (2004). Drug driving among injecting drug users in Sydney, Australia: Prevalence, risk factors and risk perceptions. *Addiction, 99*, 175-185.

Davey, J. D., Davey, T., & Obst, P. L. (2005). Drug and drink driving by university students: An exploration of the influence of attitudes. *Traffic Injury Prevention, 6*, 44-52.

Davey, J. D., Davies, A., French, N., Williams, C., & Lang, C. P. (2005). Drug driving from a user's perspective. *Drugs: Education, Prevention and Policy, 12*, 61-70.

Davey, J. D., Leal, N., & Freeman, J. (2007). Screening for drugs in oral fluid: Illicit drug use and drug driving in a sample of Queensland motorists. *Drug and Alcohol Review, 26*, 301-307.

Davey, J. D., Williams, C. K., & Davies, A. C. (2001). *Ripped and driving Down Under: Drug driving and the culture of drug use in Australia.* Paper presented at the Fourth International Conference on Accident Investigation, Reconstruction, Interpretation and the Law (AIRIL '01), Vancouver, Canada.

Degenhardt, L., Dillon, P., Duff, C., & Ross, J. (2006). Driving, drug use behaviour and risk perceptions of nightclub attendees in Victoria, Australia. *International Journal of Drug Policy, 17*, 41-46.

Drummer, O. H., Gerostamoulos, D., Chu, M., Swann, P., Boorman, M., & Cairns, I. (2007). Drugs in oral fluid in randomly selected drivers. *Forensic Science International, 170*(2-3), 105-110.

Drummer, O. H., Gerostamoulos, J., Batziris, H., Chu, M., Caplehorn, J. R. M., Robertson, M. D., et al. (2003). The incidence of drugs in drivers killed in Australian road traffic crashes. *Forensic Science International, 134*, 154-162.

Drummer, O. H., Gerostamoulos, J., Batziris, H., Chu, M., Caplehorn, J. R. M., Robertson, M. D., et al. (2004). The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. *Accident Analysis & Prevention, 36*, 239-248.

Duff, C., & Rowland, B. (2006). 'Rushing behind the wheel': Investigating the prevalence of 'drug driving' among club and rave patrons in Melbourne, Australia. *Drugs: Education, Prevention and Policy, 13*, 299-312.

Elvik, R., & Christensen, P. (2007). The deterrent effect of increasing fixed penalties for traffic offences: The Norwegian experience. *Journal of Safety Research, 38*, 689-695.

Elvik, R., & Vaa, T. (2004). *The handbook of road safety measures*. Amsterdam: Elsevier.

Freeman, J., Liossis, P., & David, N. (2006). Deterrence, defiance and deviance: An

investigation into a group of recidivist drink drivers' self-reported offending

behaviours. *Australian and New Zealand Journal of Criminology, 39*, 1-19.

Freeman, J., Liossis, P., Schonfeld, C., Sheehan, M., Siskind, V., & Watson, B.

(2006). The self-reported impact of legal and non-legal sanctions on a group

of recidivist drink drivers. *Transportation Research Part F: Traffic

Psychology and Behaviour, 9*, 53-64.

Freeman, J., & Watson, B. (2009). Drink driving deterrents and self-reported

offending behaviours among a sample of Queensland motorists. *Journal of

Safety Research, 40*(2), 113-120.

Furr-Holden, D., Voas, R. B., Kelley-Baker, T., & Miller, B. (2006). Drug and

alcohol-impaired driving among electronic music dance event attendees. *Drug

and Alcohol Dependence, 85*, 83-86.

Grasmick, H. G., & Bursik, R. J. (1990). Conscience, significant others, and rational

choice: Extending the deterrence model. *Law & Society Review, 24*, 837-861.

Green, D. E. (1989). Measures of Illegal Behavior in Individual-Level Deterrence

Research. *Journal of Research in Crime and Delinquency, 26*(3), 253-275.

Hammersley, R. (2008). *Drugs and Crime: Theories and practices* Cambridge: Polity

Press.

Harris, N., Walgrave, L., & Braithwaite, J. (2004). Emotional dynamics in restorative

conferences. *Theoretical Criminology, 8*(2), 191-210.

Hoffmann, J., & Yang, X. (2005). Parental and peer influences on the risk of

adolescent drug use. *The Journal of Primary Prevention, 26*, 529-551.

Homel, R. (1986). *Policing the drinking driver: Random Breath Testing and the

process of deterrence*. Canberra: Federal Office of Road Safety.

Homel, R. (1988). *Policy and punishing the drinking driver: A study of general and specific deterrence*. New York: Springer-Verlag.

Jones, A. W. (2005). Driving Under the Influence of Drugs in Sweden with Zero Concentration Limits in Blood for Controlled Substances. *Traffic Injury Prevention, 6*, 317-322.

Jones, A. W. (2007). Age- and gender-related differences in blood amphetamine concentrations in apprehended drivers: Lack of association with clinical evidence of impairment. *Addiction, 102*, 1085-1091.

Jones, C., Donnelly, N., Swift, W., & Weatherburn, D. (2006). Preventing cannabis users from driving under the influence of cannabis. *Accident Analysis & Prevention, 38*, 854-861.

Junger, M., West, R., & Timman, R. (2001). Crime and risky behavior in traffic: An example of cross-situational consistency. *Journal of Research in Crime & Delinquency, 38*, 439-459.

Kim, M.-S., & Hunter, J., E. (1993). Attitude-Behavior Relations: A Meta-Analysis of Attitudinal Relevance and Topic. *The Journal of Communication, 43*(1), 101-142.

Lenné, M. G., Fry, C. L. M., Dietze, P., & Rumbold, G. (2001). Attitudes and experiences of people who use cannabis and drive: Implications for drugs and driving legislation in Victoria, Australia. *Drugs: Education, Prevention and Policy, 8*, 307-313.

Lo, C. C. (2004). Sociodemographic factors, drug abuse, and other crimes: How they vary among male and female arrestees. *Journal of Criminal Justice, 32*(5), 399-409.

Logan, B. K. (1996). Methamphetamine and driving impairment. *Journal of Forensic Sciences, 41*, 457-464.

Longo, M. C., Hunter, C. E., Lokan, R. J., White, J. M., & White, M. A. (2000). The prevalence of alcohol, cannabinoids, benzodiazepines and stimulants amongst injured drivers and their role in driver culpability: Part II: The relationship between drug prevalence and drug concentration, and driver culpability. *Accident Analysis & Prevention, 32*, 623-632.

Matthews, S. K., & Agnew, R. (2008). Extending Deterrence Theory: Do Delinquent Peers Condition the Relationship between Perceptions of Getting Caught and Offending? *Journal of Research in Crime and Delinquency, 45*(2), 91-118.

McIntosh, J., O'Brien, T., & McKeganey, N. (2007). Drug driving and the management of risk: The perspectives and practices of a sample of problem drug users. *International Journal of Drug Policy, 19*, 248-254.

Mears, D. P., Ploeger, M., & Warr, M. (1998). Explaining the Gender Gap in Delinquency: Peer Influence and Moral Evaluations of Behavior. *Journal of Research in Crime and Delinquency, 35*(3), 251-266.

Mura, P., Chatelain, C., Dumestre, V., Gaulier, J. M., Ghysel, M. H., Lacroix, C., et al. (2006). Use of drugs of abuse in less than 30-year-old drivers killed in a road crash in France: A spectacular increase for cannabis, cocaine and amphetamines. *Forensic Science International, 160*(2-3), 168-172.

Murphy, K., & Harris, N. (2007). SHAMING, SHAME AND RECIDIVISM A Test of Reintegrative Shaming Theory in the White-Collar Crime Context. *British Journal Of Criminology, 47*(6), 900-917.

Nagin, D. S., & Paternoster, R. (1993). Enduring individual differences and rational choice theories of crime. *Law & Society Review, 27*, 467-496.

Neale, J. (2004). Drug driving in Scotland: Prevalence and correlates amongst drug users entering treatment. *International Journal of Drug Policy, 15*, 27-35.

Ojaniemi, K. K., Lintonen, T. P., Impinen, A. O., Lillsunde, P. M., & Ostamo, A. I. (2009). Trends in driving under the influence of drugs: A register-based study of DUID suspects during 1977-2007. *Accident Analysis & Prevention, 41*(1), 191-196.

Paternoster, R. (1989). Decisions to Participate in and Desist from Four Types of Common Delinquency: Deterrence and the Rational Choice Perspective. *Law & Society Review, 23*(1), 7-40.

Piquero, A. R., & Paternoster, R. (1998). An application of Stafford and Warr's reconceptualization of deterrence to drinking and driving. *Journal of Research in Crime and Delinquency, 35*, 3-39.

Piquero, A. R., & Pogarsky, G. (2002). Beyond Stafford and Warr's reconceptualization of deterrence: Personal and vicarious experiences, impulsivity, and offending behavior. *Journal of Research in Crime and Delinquency, 39*, 153-186.

Piquero, A. R., & Tibbetts, S. (1996). Specifying the direct and indirect effects of low selfcontrol and situational factors in offenders' decision making: Toward a more complete model of rational offending. *Justice Quarterly, 13*(3), 481-510.

Poyser, C., Makkai, T., Norman, L., & Mills, L. (2002). *Drug driving among police detainees in three states of Australia*. Canberra: Commonwealth Department of Health and Ageing.

Pratt, T. C., Cullen, F. T., Blevins, K. R., Daigle, L. E., & Madensen, T. D. (2006). The empirical status of deterrence theory: A meta-analysis. In F. T. Cullen, J.

P. Wright & K. R. Blevins (Eds.), *Taking stock: The status of criminological theory* (pp. 367-395). New Jersey: Transaction Publishers.

Ramaekers, J. G., Berghaus, G., van Laar, M., & Drummer, O. H. (2004). Dose related risk of motor vehicle crashes after cannabis use. *Drug and Alcohol Dependence, 73*, 109-119.

Scheff, T. J., & Retzinger, S. M. (1991). *Emotions and violence: Shame and rage in destructive conflicts*. Lexington, MA: Lexington Books.

Schwilke, E. W., Sampaio dos Santos, M. I., & Logan, B. K. (2006). Changing patterns of drug and alcohol use in fatally injured drivers in Washington State. *Journal of Forensic Sciences, 51*, 1191-1198.

Sherman, L. W. (1993). Defiance, deterrence, and irrelevance: A theory of the criminal sanction. *Journal of research in Crime and Delinquency, 30*, 445-473.

Silberman, M. (1976). Toward a Theory of Criminal Deterrence. *American Sociological Review, 41*(3), 442-461.

Stafford, M. C., & Warr, M. (1993). A reconceptualization of general and specific deterrence. *Journal of Research in Crime and Delinquency, 30*, 123-135.

Stevenson, M., Palamara, P., Rooke, M., Richardson, K., Baker, M., & Baumwol, J. (2001). Drink and drug driving: What's the skipper up to? *Australian and New Zealand Journal of Public Health, 25*, 511-513.

Terry, P., & Wright, K. A. (2005). Self-reported driving behaviour and attitudes towards driving under the influence of cannabis among three different user groups in England. *Addictive Behaviors, 30*, 619-626.

Tittle, C. R. (1980). *Sanctions and Social Deviance*. New York: Praeger.

Tittle, C. R. (1995). *Control balance: Toward a general theory of deviance*. Boulder: Westview.

Tittle, C. R., Ward, D. A., & Grasmick, H. G. (2003). Gender, Age, and Crime/Deviance: A Challenge to Self-Control Theory. *Journal of Research in Crime and Delinquency, 40*(4), 426-453.

Tyler, T. (1990). *Why People Obey the Law*. New Haven: Yale University Press.

Walsh, J. M., de Gier, J. J., Christopherson, A. S., & Verstraete, A. G. (2004). Drugs and driving. *Traffic Injury Prevention, 5*, 241-253.

Watling, C. N., Palk, G., Freeman, J., & Davey, J. D. (2010). Applying Stafford and Warr's reconceptualization of deterrence theory to drug driving: Can it predict those likely to offend? *Accident Analysis & Prevention, 42*(2), 452-458.

Williams, K. R., & Hawkins, R. (1986). Perceptual research on general deterrence: A critical review. *Law & Society Review, 20*, 545-572.

Yu, J., Evans, P. C., & Clark, L. P. (2006). Alcohol addiction and perceived sanction risks: Deterring drinking drivers. *Journal of Criminal Justice, 34*, 165-174.

Zimring, F. E., & Hawkins, R. (1973). *Deterrence: The legal threat in crime control*. Chicago: The University of Chicago Press.

Table 1

The Percentage of Self-reported Use of an Illicit Substance by Participants

| | Type of illicit substance | | | | | | | |
| | Cannabis | | MATS | | Cocaine | | Heroin | |
Frequency of drug use	*n*	%	*n*	%	*n*	%	*n*	%
Have never used	386	(41.9)	645	(70.0)	764	(82.9)	876	(95.0)
More than a year ago	259	(28.1)	115	(12.5)	87	(9.4)	37	(4.0)
Within the last year	102	(11.1)	86	(9.3)	50	(5.4)	2	(.2)
Within the last month	63	(6.8)	40	(4.3)	12	(1.3)	1	(.1)
Within the last week	46	(5.0)	25	(2.7)	5	(.5)	3	(.3)
Within the last 24 hours	39	(4.2)	7	(.8)	2	(.2)	1	(.1)
Within the last 4 hours	27	(2.9)	4	(.4)	2	(.2)	2	(.2)

Note: MATS = meth/amphetamine type substances

Table 2

The Means and Standard Deviations (SD) of the Deterrence, Defiance, and Deviance

Variables

Construct	Mean	SD
Overall drug usage	6.27	3.15
Deterrence Theory		
Certainty	4.42	2.37
Severity	6.87	2.62
Swiftness	4.97	2.41
Defiance Theory		
Feelings of shame	6.25	3.14

Fairness of sanctions	6.29	2.53
Legitimacy of sanctioning authority	8.47	2.53
Deviance Theory		
Respect for the law	7.84	2.41
Moral attachment to the norm	8.23	2.71
Intentions to drug drive in the next six months	7.36	28.57

All variables have a range of 1-10, except for overall drug usage (4-28) and intentions to drug drive in the next six months (0-182).

Table 4

Demographic, Deterrence, Defiance, and Deviance Variables Logistic Regression Co-efficients for Intentions to Drug Drive in the next six Months.

Study variables	B	S.E.	Wald	OR	95% Confidence interval for OR	
					Lower	Upper
Model 1						
Gender (male)	1.39	.21	44.85**	4.03	2.68	6.01
Age	-.02	.009	7.36*	.98	.96	.99
Employment status (no)	-.5	.27	3.51	.6	.36	1.02
Constant	-1.69	.31	30.53**	.11		
Model 2						
Gender (male)	.96	.26	13.25**	2.6	1.56	4.36
Age	-.001	.01	.01	1	.98	1.03
Employment status (no)	-.68	.36	3.65	.51	.25	1.02
Overall drug consumption	.6	.05	164.77**	1.82	1.66	1.99
Constant	-6.5	.59	120.34**	.002		

Model 3						
Gender (male)	.22	.3	.56	1.25	.7	2.25
Age	-.003	.02	.05	.99	.97	1.03
Employment status (no)	-.75	.41	3.37	.48	.21	1.05
Overall drug consumption	.49	.05	90.44**	1.63	1.48	1.81
Deterrence Theory						
Certainty	-.05	.06	.55	.95	.84	1.08
Severity	-.01	.06	.04	.99	.88	1.12
Swiftness	-.008	.06	.02	.99	.88	1.12
Defiance Theory						
Feelings of shame	-.23	.05	18.42**	.79	.71	.88
Fairness of sanctions	.02	.06	.11	1.02	.91	1.14
Legitimacy of sanctioning authority	-.13	.05	6.51*	.88	.8	.97
Deviance Theory						
Respect for the law	.05	.07	.69	1.06	.93	1.2
Morals attachment to the norm	-.2	.05	15.11**	.82	.74	.91
Criminal record (yes)	.68	.35	3.91*	1.98	1.01	3.89
Constant	-1.83	1.11	2.73	.16		

OR = odds ratio.
*Note: *p < .05, **p < .001.*

Table 3

Bivariate Correlations between Deterrence, Defiance, and Deviance Variables and Intentions to Drug Drive

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (male)	-	-.05	-.09*	.2**	-.07*	.005	.001	-.25**	-.07*	-.15**	-.25**	-.27**	.22**	.24**
2. Age		-	.09**	-.07**	.03	-.06*	-.03	-.005	-.04	.03	.13**	.07**	.04	-.03
3. Employment status (no)			-	-.09**	.03	-.07*	.05	.05	.04	.02	.05	.06*	-.05	-.09**
4. Overall drug consumption				-	-.11**	.07**	-.08**	-.28**	-.06*	-.26**	-.33**	-.4**	.28**	.49**
5. Certainty					-	.08**	-.12**	.19**	.09**	.06*	.08**	.12**	-.07*	-.17**
6. Severity						-	-.32**	.06*	.12**	.09**	.007	-.04	-.03	-.005
7. Swiftness							-	-.05*	-.07**	-.04	.002	.06*	.02	-.02
8. Feelings of shame								-	.17**	.27**	.29**	.38**	-.22**	-.37**
9. Perceived fairness of sanctions									-	.19**	.21**	.18**	-.09**	-.11**
10. Legitimacy of sanctioning authority										-	.34**	.45**	-.22**	-.36**
11. Respect for the law											-	.45**	-.24**	-.29**
12. Moral attachment to the norm												-	-.23**	-.47**
13. Criminal record (yes)													-	.32**
14. Intentions to drug drive in the next 6 months														-

*p < .05 (two-tailed), **p < .01 (two-tailed).