

The impact of new oral fluid drug driving detection methods in Queensland: Are motorists deterred?

Freeman, J. & Davey, J.

Centre for Accident Research and Road Safety – Queensland, Queensland University of Technology

Police services in Queensland have commenced random roadside drug testing of drivers to both apprehend and deter possible offenders. The present study aimed to examine a sample of Queensland drivers' ($N = 450$) level of awareness of the new testing method as well as determine the impact of the countermeasure and other non-legal sanctions on intentions to drug drive.

Data was collected over a three month period using a snowball sampling approach which involved encouraging general motorists, in particular university students, to complete the survey.

The results indicated that participants were generally unaware of the new testing method and a similar proportion remained uncertain regarding the effectiveness of drug testing drivers. Nevertheless, an examination of the factors associated with intentions to drug drive again in the future revealed that perceptions of apprehension certainty was a significant predictor, as those who reported a lower certainty of apprehension were more likely to report intending to offend. Additionally, self-reported recent drug driving activity was also identified as a significant predictor, which indicates that past behaviour is a good predictor of future behaviour in the current context. In contrast, informal sanctions such as peer loss, physical injury, or internal loss (e.g., shame) were not found to be predictors of drug driving, although may still enact some deterrent effect.

The findings of the study confirm the popular deterrence-based assumption that increasing perceptions of apprehension certainty, such as through random road-side testing, may yet prove to be an effective method of reducing the burden of drug driving on road safety.

Keywords

Drug Driving, Deterrence, Legal Sanctions

Introduction

At present, research is demonstrating that a substantial proportion of motorists are driving after consuming illicit substances (Adlaf, Mann, & Paffia, 2003; Davey, Leal, & Freeman, 2007; Del Rio, Gomez, Sancho, & Alvarez, 2002; Drummer, Gerostamoulos, Batziris, Chu, Caplehorn, Robertson et al., 2003). Current research has suggested that the prevalence of drug driving may be significantly higher than drink driving (Davey, Leal, & Freeman, 2007). Alarming, drug driving amongst motorists has been strongly associated with accident culpability as research is demonstrating a particularly strong relationship between drug use and crash involvement (Drummer, et al. 2003). For example, a decade long Australian research project evaluating the causes of road crashes estimated that approximately 25% of drivers killed in road crashes tested positive to at least one illicit drug (Drummer et al, 2003). Consequently, the increasing drug driving problem has resulted in a number of

countermeasures being implemented and developed to help reduce the prevalence of drug driving in the community.

In general, drug driving countermeasures commonly consist of one of four components which are: prevention, detection, action and research (Drummer, 1995). Action and research have been demonstrated to be effective in determining the prevalence of drug driving amongst the general motoring population (Drummer et al, 2003; Drummer, 2005; Davey, Freeman, & Lavelle, in press) and also in forming and developing anti-drug driving education schemes (Arboleda, Morrow, Crum, & Shelley, 2003). However, it appears that the most beneficial and useful of the four elements appears to be associated with detection and prevention of new countermeasures. The recent introduction of oral fluid drug testing methods has increased the probability that motorists who consume illicit substances and drive can be detected. As a result, a number of drug testing legislations have been enacted within Australian states (e.g., Queensland and Victoria) and preliminary research has produced positive results in regards to the possible detection of drivers under the influence of illicit substances (Davey, Leal & Freeman, 2007). The development and advancement of oral fluid drug testing has provided authorities with the prospect of expanding drug driving legislation to both deter general motorists as well as prosecute drug driving offenders. Drug driving detection legislation has recently been introduced in Victoria, South Australia and Queensland and therefore, this offers an opportunity for the current study to investigate the deterrent influence of the new drug driving legislation and associated testing method.

The present study's objective is to investigate the preliminary deterrent influence of random drug testing detection methods on the prevalence of drug driving on a sample of Queensland motorists. The Classic Deterrence theory was considered appropriate given the apprehension and enforcement-based approach of the countermeasure and thus the framework was utilised in the current study. The Classic Deterrence theory, proposes that individuals will avoid offending if they sense the fear of apprehension for the offence or the perceived consequences for the act (Gibb, 1975). Deterrence based theories are essential to criminal justice policy (Andenaes, 1974; Cavaiola & Wuth, 2002; Piquero & Pogarsky, 2002) and remain the foundation for a number of countermeasures focused at reducing the prevalence of drug driving, including random roadside drug testing, public education and mass media campaigns e.g. radio and television advertising. The theory suggests that behaviour, specifically illegal offending behaviour, is distinctively related to the certainty, severity and swiftness of the punishment for the crime (Taxman & Piquero, 1998). Consequently, the three factors of perceiving a high probability of apprehension and receiving equally severe and swift punishment have reliably been established as fundamental to deterring offending behaviours.

Despite the vast amount of research that has focused on drink driving and these assumptions, little is known or understood about the factors that impact and may possibly deter motorists from consuming illicit drugs and driving. The infancy of the drug driving field is reflected in the lack of research within this area, as the majority of the research has concentrated on crash culpability and/or drug testing technologies. Preliminary research within this area has examined the impact of legal sanctions on intentions to drug drive and has proposed that perceptions of apprehension certainty play a fundamental role in deterring motorists from consuming illicit drugs and driving (Davey, Davies, French, Williams & Lang, 2005; Jones, Donnelly, Swift, & Weatherburn, 2005). One such study was Jones, et al (2005), who investigated the perceptions and driving behaviours of cannabis users in Victoria and found that increasing the certainty of apprehension through countermeasures such as random roadside drug testing, potentially would produce the greatest reductions in the prevalence of

drug driving compared to either severity of sanctions or supplying factual information regarding the risks associated with drug driving behaviours.

Taking into account that possibly a sizable proportion of drug drivers continue to offend whilst remaining undetected, it is therefore of theoretical importance to investigate whether informal sanctions can also provide a deterrent effect on offending behaviour. In fact, a body of research is accruing that is indicating that non-legal sanctions can also provide a deterrent impact on a large scope of offences (Berger, & Snortum, 1986; Snortum, 1988; Stafford, & Warr, 1993). The inclusion of non legal sanctions in the deterrence literature emerged from criticisms that the Classic Deterrence theory does not explain a range of non legal issues that may in fact influence driving behaviours (Sherman, 1993; Snortum, 1988; Anderson, Chiricos, & Waldo, 1977; Vingilis, 1990; Williams & Hawkins, 1986). However, little research has been conducted on the impact of non-legal sanctions on drug driving and deterrence. As a result, it was considered appropriate in the current study to also explore the impact of non-legal sanctions on drug driving behaviour. The model utilised was originally developed by Homel (1988) to investigate the impact of Random Breath Testing, and is now being employed in a variety of road safety deterrent research initiatives (Baum, 1999; Freeman, Liossis, Schonfeld, Sheehan, Siskind, & Watson, 2006). The model is composed around four main components that influence driver behaviour including:

1. Traditional legal control mechanisms that are believed to pose a threat of material loss (e.g., fines and licence disqualification);
2. Social stigma as a result of informal sanctions (e.g., peer disapproval);
3. Feelings of guilt from internalisation of norms (e.g., feeling guilty or ashamed); and
4. The risk of physical loss (e.g., an accident or damaging one's vehicle).

Taken together, the current study was conducted during the first 6 months of the implementation of the Drug Driving Legislation in Queensland. The objective was to conduct an exploratory investigation into the self-reported deterrent influence of random road-side drug testing, and more generally legal and non-legal sanctions amongst a sample of motorists in Queensland. The present study has four major research questions:

1. Are motorists aware of the new random road-side drug testing methods being implemented in Queensland?
2. How do drivers perceive the certainty, severity and swiftness of drug driving related sanctions?
3. Do motorists report being concerned about non-legal sanctions that may result from drug driving? and
4. Do legal and non-legal sanctions function as a deterrent against offending?

Method

Participants and Design

A total of 462 respondents volunteered to participate in the study. Over a 6 month period, data was collected using a snowball sampling approach. This method relies on peer networks and referrals and involved encouraging general motorists to participate. In particular, the researchers distributed the questionnaires to university students on a number of campuses, patrons at shopping centres, and spectators at sporting events. Participation in the study was voluntary and withdrawal was permitted at any time, without questioning.

Materials

Demographic Details. The first section of the questionnaire was designed to assess a variety of demographic information such as the age, gender, employment and frequency of driving. The demographic section also incorporated questions that relate to the frequency of participants' previous drug driving behaviours in the last six months, as well as intentions to consume illicit drugs and drive in the future. Additionally, questions regarding the effectiveness and awareness of the new drug driving legislation and testing method were included e.g., How effective do you think the drug testing method will be in detecting drivers who are under the influence of drugs?

Self Reported Drug Use. Drug consumptions levels were assessed using 4 items that recorded participants' most recent drug use. Items on the scale included recent use of cannabis, amphetamine type substance, heroin and cocaine, with the scale ranging from 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 and have never used.

Deterrence Questionnaire. The Deterrence questionnaire consisted of questions that were associated with legal and non-legal sanctions. It consisted of 13 questions, with two to three items focusing on each of the six deterrent factors e.g., certainty, severity, swiftness and social, internal and physical loss. Participants were required to respond on a 10-point scale (1 = strongly disagree, 5 = unsure, 10 = strongly agree). Examples of items include: "If I was to drive after using drugs, I would be concerned that I might lose my friends' respect" (social loss), "I feel guilty after taking drugs then driving" (internal loss), "If I was to drive after using drugs, I would worry that I might get injured or hurt" (physical loss), "The penalty I would receive if I was caught for drug driving would cause a considerable impact on my life" (severity).

Results

Sample Characteristics

A total of 462 motorists from the region of Brisbane volunteered to participate in the study. The average age of participants was 34, with a range from 17 to 81. The sample consisted of an equal part male and female participants (male $n = 232$, 50.2%). The majority of participants reported having some form of employment at the time the questionnaire was completed ($n = 370$, 80.3%). On average, the sample reported predominantly driving daily ($n = 371$, 81.4%) or three to five times per week ($n = 52$, 11.4%). A proportion of the sample ($n = 65$, 14.1%) reported being convicted of a criminal offence and 8 participants indicated being convicted of a drug driving offence.

Self Reported Behaviours

To examine participants self reported drug use, an analysis was undertaken that revealed that cannabis was the most frequently consumed substance followed by amphetamines, cocaine and heroin. More specifically, as shown in Table 1, 37% of the sample reported using cannabis within the last year while 19% reported using amphetamines during the same time period.

Table 1.
Level of Drug Consumption

Drug Type	Cannabis		Amphetamines		Cocaine		Heroin	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Drug Consumption								
Within 4 hours	17	(3.7)	2	(0.4)	1	(0.2)	1	(0.2)
Within the last 24 hours	27	(5.9)	1	(0.2)	1	(0.2)	1	(0.2)
Within the last week	37	(8.0)	15	(3.2)	4	(0.9)	2	(0.4)
Within the last month	39	(8.5)	24	(5.2)	5	(1.1)	1	(0.2)
Within the last year	54	(11.7)	48	(10.4)	33	(7.1)	1	(0.2)
More than a year ago	129	(28.0)	67	(14.5)	62	(13.4)	27	(5.9)
Never	158	(34.3)	304	(65.9)	356	(77.1)	428	(92.8)

In addition to the analysis of self-reported drug consumption, previous drug driving behaviours was also examined. Firstly, regarding the frequency of drug driving in the previous 6 months, almost one third ($n = 128$, 27.9%) of the sample reported drug driving at least once. More specifically, 15.7% reported drug driving once or twice, followed by 3 to 5 times (4.1%), 6-10 times (2.2%), and 5.9% reported more than 10 times. Secondly, the frequency of being a passenger in a car whilst the driver was under the influence of drugs in the preceding 6 months was also documented with over a third of the sample reporting at least once ($n = 160$, 34.8%). Lastly, regarding the intentions of participants to drug drive in the next 6 months, 23.2% ($n = 107$) of the sample reported intending to drug drive at least once, with a frequency ranging from 1 to 182 times.

Perceptions of Drug Driving Testing Methods

A central objective of the current study was to investigate participants' perceptions and awareness of the new drug driving legislation and testing method implemented in Queensland. Firstly, over a third of the sample (39%) reported being unaware or unsure of the new drug driving testing method whilst more than half of participants' (53.4%) reported being uninformed or were uncertain of the new legislation. Additionally, results concerning the effectiveness of the testing method in detecting drivers who are under the influence of drugs revealed that almost half (46.0%) of the sample reported being unsure, followed by respondents reporting that they believe the testing method will be effective (37.9%). Lastly, with regard to participants perceptions of the effectiveness of the drug testing methods at reducing the likelihood of other motorists drug driving 35.8% reported it would likely be effective, followed by 29.5% of the sample who reported being unsure.

Perceptions of Legal and Non-Legal Sanctions

Another objective of the study was to examine participants' self-reported perceptions of the drug driving legal sanctions. Respondents' scores were separated into 3 equal divisions on a 10-point scale (based on natural breaks in the distribution) representing low (1.00-3.33), medium (3.34-6.66) and high groups (6.67-10.00). With regard to factors relating to Classical Deterrence, the majority of the sample were undecided on the chances of being apprehended for drug driving, whilst a considerable proportion of the sample also reported the probability to be high (42.4%). Similarly, perceived severity of sanctions yielded analogous results, with the sample predominately reporting the penalties would be severe (48%) followed by a large proportion of the sample also being unsure of the severity of sanctions. In relation to the time between apprehension and conviction, over half of participants reportedly were undecided,

however almost a third of participants (33%) believed that the time between apprehension and conviction to be swift.

The third objective of the current study was to investigate whether participants are concerned about non legal sanctions that could result from drug driving. Firstly, in relation to social sanctions, the largest proportion of the sample reported being concerned about perceived penalties for example, losing their friends' respect (46.8%). Similarly, in regards to internal and physical loss, the largest proportion of the sample reported they would feel guilty after drug driving (47%), whilst 57% reported being concerned about injuring themselves or damaging their car.

Table 2.

Self-reported Measures of Legal and Non-legal Deterrence

Perceptions	Mean	(SD)	Low	Unsure	High
Certainty	6.25	2.05	9.0% (n = 39)	48.6% (n = 210)	42.4% (n = 183)
Severity	6.64	1.89	5.4% (n = 24)	46.6% (n = 207)	48.0% (n = 213)
Swiftness	6.08	2.48	16.6% (n = 75)	50.4% (n = 227)	33.0% (n = 149)
Social Loss	5.88	3.19	27.9% (n = 109)	25.3% (n = 114)	46.8% (n = 211)
Internal Loss	6.08	3.11	26.0% (n = 107)	27.0% (n = 111)	47.0% (n = 193)
Physical Loss	6.70	3.08	21.7% (n = 96)	21.2% (n = 94)	57.1% (n = 253)

Predictors of Future Drug Driving Behaviours

Firstly, examination of the bivariate correlations between the variables and intentions to re-offend revealed a number of significant relationships. Additionally, the results showed some noteworthy bivariate correlations between the variables. For example, intentions to offend appear to have a positive correlation with self-reported frequency of drug driving in the past 6 months ($\tau = .71^{**}$), and drug consumption levels ($\tau = .51^{**}$). Additionally, negative relationships were identified between certainty of apprehension ($\tau = -.43^{**}$), severity of sanctions ($\tau = -.12^{**}$), and the three non-legal sanctions: social ($\tau = -.43^{**}$), internal ($\tau = -.46^{**}$), and physical loss ($\tau = -.47^{**}$)¹. In contrast, swiftness of sanctions appeared to have no significant relationship with intentions to offend.

Finally, the last objective of the study was to investigate the relationship between perceptions of legal and non legal sanctions and their deterrent impact upon intentions to re-offend. Examination of the descriptive statistics revealed breaches of normality, linearity and homoscedasticity. Therefore to accommodate these breaches, a logistic regression analysis was conducted to investigate the role of the Classic Deterrence Doctrine (certainty, severity and swiftness), non-legal sanctions (social, internal and physical), as well as drug consumption levels and recent drug driving behaviours, to the outcome variable of future intentions to drug drive. The outcome variable, intentions to consume drugs and drive in the future, was measured on a continuous scale that was separated into two groups: (1) those who reported that they would not drug drive again in the next six months (deterred group), and (2) those who reported intending to drug drive again (undeterred group).

¹ Given the non-normal distribution of the data, rank-order correlations (e.g., Kendall's Tau) were computed in the place of Pearson's correlations to reduce the influence of distribution anomalies (Tabachnick & Fidell, 1996).

The variables in each model, the regression co-efficients, as well as the Wald and odds ratio values are presented in Table 3. Self-reported frequency of drug driving behaviours in the last six months was entered in the first step to examine, as well as control for, the influence of recent offending behaviour(s) before the inclusion of the proposed deterrent factors. As anticipated, participants who reported regular consumption of drugs and driving in the previous 6 months, were most likely to indicate that they would drug drive again in the future, $p < .001$.

Next, the Classic Deterrence factors (certainty, severity and swiftness), as well as the three non-legal sanctions (social, internal and physical loss), in combination with self-reported drug consumption levels, were inserted to determine whether the proposed deterrent factors enhanced the predictions of drug driving intentions over and above recent drug driving behaviours (step 2). Drug consumption was measured as a combination of the four questions obtained from the self-reporting drug use section of the questionnaire. Participants were assigned a total score based on these questions.

Collectively, the variables were significant with a chi-square statistic $X^2 (7, N = 286) = 184.56, p < .001$. Similar to step 1, the frequency of drug driving in the previous six months continued to be a significant predictor of intentions to drug drive again in the future ($p < .001$). Additionally, the model revealed that perceptions concerning certainty of apprehension were a significant contributor to the prediction of participants intentions to consume drugs and drive again in the future at the $p < .05$ level. In particular, respondents who reported a low perceived certainty of apprehension were significantly more likely to drug drive than those who perceived the probability of being caught for drug driving to be high. In addition, the model indicated that drug consumption levels were a significant predictor of participants intentions to drug drive in the future, specifically, that those who reported frequently using drugs were significantly more likely to consume drugs and drive than those who reported limited use of drugs. Juxtaposed to the above results, perceptions regarding the severity and swiftness of sanctions in addition to the three non-legal sanctions, did not contribute to the prediction of intentions to offend.

To determine the sensitivity of the results, several additional regression models were estimated. A test of the full model with all independent variables entered collectively, in addition to the two models entered individually confirmed the same significant predictors (certainty of apprehension, previous drug driving behaviour and drug consumption). Similarly, forward and backward stepwise regression identified the same predictors. Inclusion of previous drug driving convictions, perceptions of testing effectiveness and socio-demographic characteristics did not increase the predictive value of the model.

Table 3.

Logistic Regression Analysis of Intentions to Drug Drive as a function of Legal and Non Legal Sanctions, Drug Consumption Levels, and Previous Drug Driving Behaviours.

Variables	B	SE	Wald	Odds ratio	95% C.I.	
					Lower	Upper
Step 1						
D.D. Last 6 mths ¹	1.82**	.22	66.77	6.16	3.98	9.53
Model Chi-Square 153.40** (df = 1)						
Step 2						
D.D. Last 6 mths ¹	.75**	.21	13.09	2.12	1.41	3.18
Certainty ²	-.28*	.12	5.74	.75	.52	.95
Severity ²	-.15	.12	1.65	.86	.69	1.08
Swiftness ²	-.02	.08	.04	.99	.84	1.16
Social ²	-.07	.11	.41	.93	.75	1.16
Internal ²	-.13	.13	.98	.88	.68	1.13
Physical ²	-.12	.12	.86	.90	.71	1.13
Drug Consumption ³	1.15**	.28	16.59	3.17	1.81	5.51
Model Chi-Square 233.77** (df = 8)						
Block Chi-Square 80.37** (df = 7)						

Note. D.D. in last 6 mths = Frequency of drug driving in the last six months; ¹ = 5 point scale, ² = 10 point scale, ³ = 7 point scale, * p<.05, **p<.01.

Discussion

The objective of the present study was to investigate a sample of Queensland drivers' level of awareness of the new drug driving testing method, in addition to determining the influence of the countermeasure, as well as other non legal sanctions, on intentions to consume drugs and drive. In particular, the study aimed to investigate whether motorists are aware of the random roadside drug testing methods, the perceived influence of the legal and non-legal sanctions that may accompany apprehension for a drug driving offence, and the factors relating to intentions to offend in the future. Examination of the sample characteristics revealed that the majority of participants can be considered younger drivers, and it is noteworthy that a considerable percentage reported consuming drugs in the last year (e.g., cannabis, 37.7%) and/or reported drug driving in the last six months (27.9%).

Awareness of New Drug Driving Testing Methods

The first objective of the study was to examine participants' perceptions and knowledge of the new drug driving legislation and testing method implemented in Queensland. The results indicated that a sizeable proportion of the sample were not aware of the introduction of random road-side drug testing and the corresponding legislation. However it is noteworthy that in Queensland, the drug driving countermeasures had only recently been introduced and enforced when the data was being collected (6 months). Nevertheless, it is still somewhat surprising that a considerable proportion of the sample reported a low level of awareness despite the comparatively prominent publicity surrounding its introduction including television advertisements, electronic road-side signage, media print, etc. Similarly, a

comparable proportion of participants were also uncertain concerning the effectiveness of the drug testing and whether it would reduce the probability of other motorists drug driving. In broader terms, this finding does not necessarily support Queensland Police Service's current commitment to increasing motorists' levels of awareness regarding implementing road side testing, although it is noted the sample size was small and may not be representative of the large driving population. Nevertheless, from a deterrence perspective, the findings are also not in congruence with the central theme that increasing motorists' awareness of countermeasures (and to a lesser extent actually observing police enforcement efforts) are crucial to developing a strong deterrent impact (Watson & Freeman, 2007). While only preliminary, the results indicate that further emphasis on increasing motorists' awareness of random road-side drug testing (and conducting follow-up research to determine whether such awareness has increased) may be warranted in order to influence the implementation of the countermeasure.

Perceptions of Non-Legal Sanctions

The second objective of the present study was to investigate participants' self-reported perceptions of legal sanctions, which were developed from the Classic Deterrence Doctrine. Firstly, a major finding of the study was that majority of the sample were undecided on the chances of being apprehended for drug driving, which may be reflective of the lack of awareness and understanding that a large proportion of the sample reported regarding the implementation of roadside drug testing in Queensland. Nevertheless, and encouragingly, a sizeable proportion of the sample believe the chances of presently being apprehended for drug driving was high, which is important as a growing body of research has demonstrated perceptions of arrest certainty is the most influential deterrent outcome on offending behaviour (Nagin & Pogarsky, 2001; Paternoster, Saltzman, Chiricos, & Waldo, 1982). Not surprisingly, as majority of participants had not been apprehended for a drug driving offence, it was expected that a considerable proportion also would remain unsure regarding the severity of the penalties associated with the legislation. Despite this, a positive outcome was that a sizable proportion still reported the penalties would be severe (although not swift), with the former being an important part to the Classical Deterrence Doctrine.

The results regarding the non-legal sanctions may perhaps be considered more positive, as the largest proportion of the sample reported being concerned about such alleged penalties as losing their friends' respect and being ashamed if their friends were notified of their drug driving behaviour. Likewise, the results regarding internal and physical loss suggested that the largest proportion of the sample reported that they would feel guilty after drug driving, and reported being concerned about injuring themselves or damaging their car, which provides some level of support for the theory that non-legal sanctions have the potential to influence offending behaviours (Berger & Snortum, 1986; Snortum, 1988; Stafford & Warr, 1993). Taking into consideration that the results are preliminary, the findings still suggest that deterrence or education-based campaigns (e.g., media) could benefit from highlighting the related non-legal consequences from drug driving such as personal injury, peer loss etc. Nonetheless, in the current study, it is noteworthy that at the multivariate level of analysis, perceptions of apprehension certainty were reported to have a greater deterrent influence than non legal sanctions. As a result, further research is warranted to determine if some level of non-legal sanctions have a deterrent impact amongst motorists who engage in drug driving behaviours.

Predictors of Intentions to Drug Drive

The third objective of the study was to predict those who intended to drug drive again in the future and the results demonstrated that previous offending behaviours, perceptions of apprehension certainty, and drug consumption were all significantly associated with self reported intentions to offend. Firstly, in relation to past offending behaviours, consistent with previous traffic offending research (Freeman, Liossis, Schonfeld, Sheehan, Siskind, & Watson, 2006), past behaviour was in fact a good predictor of future behaviour. In the present study, a sizeable proportion of the sample (23%) reported intentions to consume drugs and drive at least once in the next 6 months. More specifically, it appears that past behaviours may be counteracting the deterrent impact suggested to stop the offending behaviour, and additionally, that regular drug consumption also has a strong influence on patterns of drug driving behaviour(s). In regards to the latter point, consuming illicit substances more frequently was also predictive of drug driving behaviours, which highlights the deleterious and serious effects that drugs may have not only on deterrence but also road safety.

Whilst this may be the situation for a small group of heavy drug users, it is yet to be validated that perceptions of low certainty of apprehension presently also remain fundamental to the drug driving problem. Since random road-side drug testing is currently within its early stages of implementation in Queensland, it appears that a substantial proportion of the sample, more specifically those who are likely to offend, believe the chances of apprehension to be reasonably low. As previously reported, perceptions of arrest certainty have been considered the most influential in regards to deterring offending behaviour (Nagin & Pogarsky, 2001; Paternoster, Saltzman, Chiricos, & Waldo, 1982) and this notion is also supported by the success of Random Breath Testing in Australia. Consequently, it will be of importance to determine whether motorists' perceptions of the probability of apprehension increase with the growth and expansion of random roadside drug testing in the future, and the impact this increase in apprehension certainty has on offending behaviour. Nonetheless, what appears clear is that currently a considerable percentage of motorists believe the chances of being apprehended remain low, and such perceptions are related with future offending behaviours.

When interpreting the findings, a number of methodological limitations associated with the study should be taken into account. Participants were not randomly selected, but rather, the questionnaire was distributed mainly to university students, shopping centre customers and sporting spectators. As a result, questions remain regarding the representativeness of the sample as a considerable proportion of the participants can be considered to be younger drivers. The accuracy of the self-reported data remains susceptible to self-reporting bias, especially responses that focus on further offending behaviours. Furthermore, it remains uncertain whether stated intentions are effective predictors of future behaviours. The relatively small sample size limits: (a) statistical power and the inclusion of other variables and (b) generalisations to the larger driving population. Additionally, the DQ scale developed for the present research requires further validation and amendment with a larger sample size.

Despite such limitations, overall the findings of the current study indicate that low certainty of apprehension, in addition to previous drug driving behaviours, as well as regular drug consumption, are associated with drug driving behaviours. As a result, further implementation and promotion of interventions that are designed to increase perceptions (as well as the actual likelihood of apprehension) are crucial to reducing the burden of drug driving on road safety. More specifically, a challenge for researchers and policy makers is to develop police enforcement practices that increase perceptions of arrest certainty including, increased police

presence and targeted apprehension tactics at high drug driving times. However, the ongoing reliance on the processes of deterrence should not reduce the need for a diversity of countermeasures to help with the increasing problem of drug driving. Rather, what appears likely is that multi-modal interventions (e.g., education, deterrence) will be necessary to reduce the prevalence of drug driving, which has more recently been indicated to be higher than drink driving [2]. Nevertheless, random road-side drug testing presents with unique possibilities to increase both the likelihood of apprehending offending motorists as well as providing a considerable general deterrent impact, if motorists are both aware of the implementation and associated consequences of the countermeasure.

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