

Perceptual Deterrence versus Current Behaviours: A Study into Factors Influencing Drug Driving

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Abstract

Introduction and Aims: Research is continuing to demonstrate that alarming numbers of motorists are driving after consuming illicit substances. As a result, a range of interventions are being implemented to apprehend and deter drug driving behaviour, in particular the recent implementation of random roadside drug testing procedures in Queensland. Given this countermeasure has a strong deterrence foundation, it is of interest to determine whether deterrence-based perceptual factors such as the certainty and severity of sanctions are influencing this offending behaviour or whether self-reported drug driving is heavily dependent upon illicit substance consumption levels and past offending behaviour.

Design and Methods: A sample of Queensland motorists' ($N = 899$) completed a self-report questionnaire that collected a range of information including drug driving and drug consumption practices, conviction history and perceptual deterrence factors.

Results: Analysis of the collected data revealed that approximately 20% of participants reported drug driving at least once in the last six months. Overall, there was considerable variability in respondent's perceptions regarding the certainty, severity and swiftness of legal sanctions, although the largest proportion of the sample did not consider such sanctions to be certain, severe, or swift. In regards to predicting those who intended to drug driving again in the future, a combination of perceptual and behavioural based factors were associated with such intentions. More specifically, the certainty of apprehension and experiencing social sanctions were found to reduce the likelihood of drug driving while past offending behaviours and increased drug consumption levels increase the risk of offending in the next six months. However, a closer examination revealed that behaviours, rather than perceptions, proved to have a greater level of influence on the current sample's future intentions to offend.

Discussion and Conclusion: The results indicate that drug driving is relatively prevalent on Queensland roads, and a number of factors are likely to influence the behaviour. This paper further outlines the major findings of the study and highlights that multi-modal interventions are most likely required to reduce the prevalence of drug driving on public roads.

Keywords: Drug Driving, Deterrence, Drug Behaviours.

Introduction

A growing body of research is demonstrating that a substantial proportion of motorists are driving after consuming illicit substances (Davey, Leal & Freeman, 2007; Drummer et al., 2003), and some evidence suggests drug driving may be significantly higher than drink driving in some regions (Davey et al., 2007). This is of particular concern as a mounting body of evidence is demonstrating a strong relationship between drug use and increased crash involvement (Drummer et al., 2007; Mura et al., 2006). The gravity of the problem is reflected in the amount of effort dedicated towards identifying the extent of the problem as well as implementing effective countermeasures to reduce the offending behaviour. Specifically, drug driving countermeasures have generally been categorised into the spheres of prevention, detection, action and research. While action and research have proven effective in regards to more recently identifying the prevalence of drug driving within the motoring population (Davey et al., 2003; Del Rio, 2002; Drummer et al., 2003) and directing the development of anti-drug driving education programs (Arboleda, Morrow, Crum & Shelly, 2003), the most promising direction appears to be associated with new detection and prevention countermeasures.

The recent development of oral fluid drug testing mechanisms has provided the opportunity to dramatically increase the likelihood of detecting motorists who drive after consuming illicit substances. Currently, a number of drug testing trials are underway within motorised countries, and preliminary research has produced positive results in regards to the possible detection of drugged drivers (Buttress et al., 2004; Davey et al., 2007; Wylie et al., 2005). As a result, the recent introduction of oral fluid drug testing

has provided authorities with the opportunity to expand drug driving legislation to both deter general motorists as well as prosecute drug driving offenders. Within Australia, a number of states have recently introduced drug driving detection legislation, although comprehensive evaluations of the initiatives have yet to be published. Nonetheless, what remains evident is that similar to Random Breath Testing, the countermeasure relies heavily on the principles of deterrence.

Principles of Deterrence

Attempts to apprehend and convict individuals who breach community laws have a number of purposes including punishment, reform, retribution and incapacitation. However, a primary goal is to deter individuals from committing similar offences, and deterrence theory is central to many criminal justice policies (Andenaes, 1974; Piquero & Pogarsky, 2002). In particular, the Classic Deterrence Doctrine remains the predominant paradigm in regards to the above mentioned approaches, and this model proposes that individuals will avoid offending behaviour(s) if they fear the perceived consequences of being apprehended for the behaviour (Homel, 1988). Since the development of deterrence theory by Jeremy Bentham & Cesare Beccaria in the 18th Century, there have been countless research initiatives conducted to determine the impact and effectiveness of a range of deterrence-based countermeasures to reduce the prevalence of criminal offending behaviour(s). While the need for parsimony precludes a comprehensive analysis of deterrence-based approaches, the majority of deterrence research remains a minefield, with contradictory findings evident in all but a minority of factors that have been hypothesised to deter potential offenders from criminal acts. Furthermore, researchers have raised further concerns regarding issues associated with experiential effects and causal ordering, as perceptions of risk have been demonstrated to fluctuate over time (Minor & Harry, 1982; Saltzman et al., 1982). Additionally, a number of modifications and extensions have been made to the Classical Deterrence Doctrine that have ranged from including social sanctions to examining the impact of punishment avoidance (e.g., Stafford & Warr, 1993). Of note is that researchers have argued that penalties are not applied within a social vacuum, and thus a number of factors can

influence offending behaviour(s) (Akers, 1990; Homel, 1988; Williams & Hawkins, 1986).

Not surprisingly, researchers have argued that a range of factors can often influence an individual's decision to commit an offence (Bursik & Baba, 1986), and thus historically, deterrence-based models have not proven to be extremely accurate at identifying individuals most likely to offend (Yu, Evans & Clark, 2006). To some extent, weak models of deterrence-based prediction may be associated with using a rational choice model to explain behaviour that is often committed under the influence of substances and/or as well as the obvious disparity between intentions and behaviour. Moreover, research has indicated substance abuse problems can reduce the impact of sanctions (Yu, 2000), or in the current case the threat of such sanctions. Taken together, the threat of sanctions alone may not be enough to create a strong deterrent effect (Yu et al., 2006), and may be negated by counterproductive behaviours e.g., drug consumption. Nevertheless, deterrence-based approaches remain extremely influential within road safety initiatives, in particular attempts to increase perceptions of certainty of detection. Furthermore, given that detection based countermeasures often remain at the heart of road safety initiatives (and deterrence-based initiatives in general), it is crucial to determine what affect new detection techniques and corresponding legislation will have on motorists. In regards to the current case, one of the next steps appears to be to determine the preliminary effect that drug driving detection and the corresponding legislation is having on the motoring and drug using population, in order to provide some direction to practitioners and policy makers regarding avenues to promote deterrence initiatives. However, as highlighted above and from a theoretical perspective, it is also of particular interest to explore whether perceptual deterrence can counteract the negative affect of drug consumption and past offending behaviour, as research continually suggests that past behaviour remains a strong predictor of future offending (Freeman et al., 2006; Hanson & Bussiere, 1998).

Taken together, the current study was conducted during the first 12 months of the implementation of new drug driving oral fluid testing legislation in Queensland, Australia. The present study has three major research questions:

- (1) How do motorists currently perceive the certainty, severity and swiftness of drug driving-related sanctions?;
- (2) What proportion of drivers admit to using illicit substances as well as combine such usage with driving behaviours?; and
- (3) What perceptual and behavioural-based factors predict intentions to drug drive again in the future?

Method

Participants and Design

A total of 899 individuals volunteered to participate in the study. Over a twelve month period, data was collected using a snowball sampling approach. This method relies on peer networks and referrals as well as encouraging general community members 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.

Self reported drug use. Drug consumption levels were assessed using four 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 ten questions that were associated with legal sanctions, with two to three items focusing on each of the three deterrent factors e.g., certainty, severity, and swiftness. Participants were required to respond on a 10-point scale (1 = strongly disagree, 5 = unsure, 10 = strongly agree). Examples of items include: “The penalty I would receive if I was caught for drug driving would cause a considerable impact on my life” (severity), “The chances of currently getting caught for drug driving are high” (certainty), “If I was to drive after using drugs, I would be concerned that I might lose my friends’ respect” (social sanction).

Results

Sample Characteristics

The average age of the sample was 30 years ($SD = 13$; range = 16 to 81), with 51.9% of the sample being male. The majority of the participants reported having some form of employment at the time the questionnaire was completed (80.3%), and the greatest proportion reported driving daily (77.3%), followed by two to three times per week (13%). A proportion of the sample (11.3%) reported being convicted of a criminal offence. Additionally, 12 participants indicated being previously convicted of a drug driving offence, and 10.2% ($n = 92$) had a prior drink driving offence.

Self Reported Drug Consumption and Offending Behaviours

To examine participants self reported drug use, an analysis was undertaken that revealed more than half of the sample reported using one of the four illicit drugs in their lifetime ($n = 485$, 59.4%). More specifically, 14.4% reported using drugs within the last month, that included (at least) one of the four illicit drugs being considered. In regards to specific drug types, cannabis was the most frequently consumed substance followed by amphetamine type substances, cocaine and heroin. As shown in Table 1, 28% of the sample reported using cannabis within the last year while 12.6% reported using amphetamines during the same time period.

Table 1

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

Frequency of drug use	Type of illicit substance									
	Cannabis		MATS		Cocaine		Heroin		ODC	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Have never used	374	(41.6)	625	(69.5)	743	(82.6)	855	(95.1)	361	(40.1)
More than a year ago	252	(28)	113	(12.6)	85	(9.5)	35	(3.9)	275	(30.6)
Within the last year	101	(11.2)	86	(9.6)	50	(5.6)	2	(.2)	132	(14.7)
Within the last month	61	(6.8)	39	(4.3)	12	(1.3)	1	(.1)	68	(7.5)
Within the last week	46	(5.1)	25	(2.8)	5	(.6)	3	(.3)	42	(4.6)
Within the last 24 hours	38	(4.2)	7	(.8)	2	(.2)	1	(.1)	16	(1.8)
Within the last 4 hours	27	(3)	4	(.4)	2	(.2)	2	(.2)	5	(.5)

MATS = meth/amphetamine type substances; ODC = overall drug consumption

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 six months, almost one fifth 19.3% ($n = 174$) of the sample reported drug driving at least once. More specifically, 10.1% reported drug driving once or twice, followed by three to five times (2.9%), six to ten times (1.6%), and 4.7% reported more than ten times. Secondly, the frequency of being a passenger in a car whilst the driver was under the influence of drugs in the preceding six months was also examined, and almost a third of the sample reported such behaviour at least once (31.2%, $n = 280$). Lastly, regarding the intentions of participants to drug drive in the next 6 months, 17.4% ($n = 156$) indicated intending to drug drive at least once during this time period.

Perceptions of Legal and Social Sanctions

A second objective of the study was to examine participants' self-reported perceptions of the sanctions associated with drug driving. 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 (as shown in Table 2), it is noteworthy that approximately half of the sample was unsure about the certainty of apprehension (45.8%), severity of the corresponding sanction (49.2%), or the swiftness of the applied penalties once apprehended. The overall mean scores for the three subscales also reflected this uncertainty, although it is noted that participants reported significantly higher scores on the severity scale than certainty $t(898) = 4.13, p = < .001$, or swiftness factor $t(898) = 11.5, p = < .001$, with certainty being significantly different than the factor of swiftness $t(898) = 9.24, p = < .001$. However on a practical note, it may be argued that few meaningful differences exist between the score scales given the similarities between the values. Finally, it was also of interest to conduct an exploratory investigation into the possible effects of social sanctions on the offending behaviour, given that it has been proposed that a range of informal sanctions can influence criminal activity. In the presence context, approximately half the sample reported that they would be concerned about their friend's views about their drug driving behaviour (51.1%), although it is noted that a sizeable proportion also remain unconcerned (25.3%).

Table 2

Self-reported Perceptions of Legal and Social Sanctions

Perceptions	Mean	SD	Low		Unsure/Medium		High	
			%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Certainty	5.81	2.26	16.4	147	45.8	412	37.8	340
Severity	6.27	2.14	8.9	80	49.2	442	41.9	377
Swiftness	4.96	2.41	27.0	243	48.4	435	24.6	221
Social Sanctions	6.26	3.12	23.7	213	25.3	227	51.1	459

Intercorrelations between Perceptions, Behavioural, and Future Drug Driving Variables

The bivariate correlations between the perceptions, behaviours, and future intentions to drug drive were also examined as shown in Table 3. It was discovered that many of the variables had non-normal distributions, therefore Kendall's Tau was utilised to reduce the influence of distribution anomalies. While the links between the variables and intentions to reoffend are examined more closely in the following section, there are some noteworthy bivariate correlations. Regarding the perception variables, certainty of apprehension ($\tau = -.31, p < .01$) and social sanctions ($\tau = -.39, p < .01$) were significantly and negatively correlated with the propensity to drug drive in the next six months. Amongst the behavioural variables, all three were significantly and positively related to the propensity to drug drive in the next six months. The most notable correlation was that of participants' own drug driving in the last six months and a stated intention to drug drive again in the next six months ($\tau = .73, p < .01$). Additionally, being a passenger of a drug driving ($\tau = .49, p < .01$) as well as drug consumption ($\tau = .49, p < .01$) were both significantly correlated with the propensity to drug drive.

Table 3

Bivariate Correlations between Perceptual and Behavioural Variables and Intentions to Drug Drive in the Next Six Months

Perceptual and behavioural variables	1	2	3	4	5	6	7	8
1. Certainty	-	.1**	-.09**	.41**	-.29**	-.25**	-.25**	-.31**
2. Severity		-	-.33**	-.02	.009	.05	.05	.003
3. Swiftness			-	.03	-.04	-.04	-.07**	-.02
4. Social sanctions				-	-.4**	-.35**	-.42**	-.39**
5. Own drug driving in the last six months					-	.52**	.51**	.73**
6. Passenger of a drug driver in the last six months						-	.44**	.49**
7. Overall drug consumption							-	.49**
8. Propensity to drug drive in the next six months								-

Note: ** $p < .01$ (two-tailed).

Predictors of Future Drug Driving Behaviour

The final objective of the study was to identify what factors were predictive of intending to drug drive again in the future. 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 predictive role of the perception variables (i.e., certainty, severity, swiftness, and social sanctions) and the behavioural variables (i.e., criminal record, previous drug driving, being a passenger of a drug driver, and overall drug consumption), to the outcome variable of future intentions to drug drive. The outcome variable 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). Table 4 displays the coefficients, standard errors, Wald statistics, odds ratios (OR), and 95% confidence intervals for the OR.

The first step included the perception variables and overall the model was a significant predictor of the outcome variable ($\chi^2(1, 4) = 256.11, p < .001$). Taken together, 41.1% of the variance was accounted for and 86% of the sample was correctly classified. A closer examination revealed that only certainty of apprehension (OR = .78, $p < .001$) was predictive of future intentions to drug drive from the Classical Deterrence Doctrine. Additionally, social sanctions (OR = .65, $p < .001$) was also found to be predictive of reported intentions to drug drive in the next six months. Specifically, those of the sample with low apprehension certainty were significantly more likely to report future intentions of drug driving as were individuals who were least concerned about the possible social sanctions associated with the behaviour.

The second step involved inclusion of the behavioural variables into the logistic regression model, which collectively also proved to be significant ($\chi^2(1, 8) = 465.42, p < .001$). The second step accounted for an additional 26% of the variance for a total of 67.1%. It is of note that 92.7% of the sample was correctly classified as to whether they reported intentions of drug driving in the next six months or refrain from such activity. Similar to the first step, certainty of apprehension (OR = .79, $p < .05$) and social sanctions (OR = .85, $p < .05$) remained significant predictors of future intentions to drug drive, over and above inclusion of the behavioural factors. However and not surprisingly, certainty of apprehension and social sanctions were less influential predictors with respect to the full model compared to having drug driven in the last six months (OR = 3.03, $p < .001$) or overall drug consumption (OR = 3.56, $p < .001$). Lastly, inclusion of socio-economic characteristics such as age, gender, and employment status did not increase the predictive value of the model. 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 confirmed the same significant predictors. Similarly, forward and backward stepwise regression identified the same predictors. Inclusion of previous drug or drink driving convictions, awareness and perceptions of

testing effectiveness and socio-demographic characteristics also did not increase the predictive value of the model.

Table 4

Logistic Regression for Perception and Behavioural Variables for the Intention to Drug Drive in the Next Six Months.

Deterrence variables	B	S.E.	Wald	OR	95% Confidence interval for OR	
					Lower	Upper
Step 1						
Certainty	-.25	.05	21.55**	.78	.7	.86
Severity	.04	.06	.49	1.04	.93	1.16
Swiftness	-.004	.05	.006	1	.91	1.1
Social sanctions	-.43	.05	84.67**	.65	.6	.72
Constant	1.52	.55	7.52*	4.56		
Model Chi-Square 256.11** (df = 4)						
Step 2						
Certainty	-.23	.07	10.04*	.79	.69	.92
Severity	.08	.08	1.13	1.09	.93	1.27
Swiftness	.05	.06	.57	1.05	.93	1.19
Social sanctions	-.16	.06	7.24*	.85	.76	.96
Criminal Record	.48	.35	1.83	1.61	.81	3.22
Own drug driving in the L6Mths	1.11	.18	36.22**	3.03	2.11	4.35
Passenger of a drug driver in the L6Mths	.08	.14	.3	1.08	.82	1.43
Overall drug consumption	1.27	.21	36.09**	3.56	2.35	5.39
Constant	-4.7	.91	26.47**	.01		
Model Chi-Square 465.42** (df = 8)						
Block Chi-Square 209.31** (df = 4)						

Note: * $p < .05$, ** $p < .001$; OR = Odds Ratio; L6M = last six months

Discussion

The objective of the present study was to investigate whether perceptual deterrence-based factors can have an influence on drug driving or whether such offending behaviours are currently only linked with levels of illicit substance consumption and prior offences. Additionally, it was of interest to determine the extent of drug driving behaviours within a sample of Queensland motorists soon after the implementation of random road-side drug testing initiatives.

Drug Consumption and Driving Behaviours

The first noteworthy finding was that a sizeable proportion of the sample reported consuming one of the four illicit substances within the last year (29.1%) and approximately 14.4% had in fact consumed one of the substances within the last month. Not surprisingly, cannabis was the most commonly consumed substance which is consistent with a large body of research that indicates this drug is the most frequently consumed illicit substance within Australia (Australian Institute of Health and Welfare [AIHW], 2007). The findings are also most likely reflective of the sample which consisted predominantly of a group of younger individuals likely to be at risk of drug driving behaviours. Of greater note was that approximately one fifth of the sample reported drug driving in the last six months (e.g., 19.3%), and that a smaller group of arguably “hard core” offenders (4.7%) reported drug driving more than 10 times during this time period. While the introduction of random roadside drug testing had only commenced in the 12 months prior to the collection of the current data, the results indicate that drug driving remains quite prevalent on Queensland roads (most likely among some subgroups) and that considerable enforcement effort will be required to change such behaviours among some individuals. The corresponding finding that almost one third of the sample had also been a passenger in a vehicle operated by someone who had consumed illicit substances in the past six months also highlights the size of the problem, and to a lesser extent, suggests that such offending behaviours may be condoned or promoted within some social settings. Complementing this finding was that 17.3% of the sample accepted that they would likely drug drive again in the next six months.

Taken together, the findings are consistent with a growing body of self-report research that indicates drug driving is common among some driving subgroups (Akram, 1997; Terry & Wright, 2005), in particular younger cohorts (Mura et al., 2006). Nevertheless, it is noteworthy that age was not a predictor of intending to drug drive again in the future, although there was limited variance in regards to this issue within the current sample as the majority could be considered younger drivers. Notwithstanding this, younger drivers will most likely remain at an increased risk of engaging in drug taking activities, and given the heavy usage of vehicles within the Australian environment, will naturally remain at a similarly increased risk of combining drug consumption with the driving task.

Perceptions of Sanctions

A second aim of the present study was to explore participants' self-reported perceptions of legal sanctions associated with the new oral fluid testing regime, which were modelled on the Classic Deterrence Doctrine. Overall, a major finding of the study was that a sizeable proportion of the sample was unsure about the certainty of apprehension or the severity and swiftness of the associated penalties that would be applied upon conviction for a drug driving offence. Not surprisingly, given the infancy of the testing regime, this result may be somewhat reflective of a lack of awareness and knowledge about the implementation of this relatively new countermeasure. As a result and similar to Random Breath Testing, it may take some period of time for the deterrent influence of oral fluid testing to build within the motoring community. Therefore, the results suggest that a need may exist to increase the public's awareness of the campaign (particularly through media outlets), focusing not only on the increased likelihood of detection but also the corresponding sanctions that will follow a conviction. However, as this study focused predominantly on the process of general deterrence and as most participants did not report a previous conviction, it may not be surprising that the threat of legal sanctions did not have more of a salutary influence on motorists.

Given the lack of deterrence-based research within the drug driving field, it was also of interest to explore whether non-legal sanctions have the capacity to influence motorist's

drug driving behaviours. It is noteworthy that researchers have long suggested that some offences are not conducted within a social vacuum (Berger & Snortum, 1986; Williams & Hawkins, 1986), and in the current case approximately half of the sample reported that they would be concerned about their friend's views of their drug driving behaviour. Furthermore, such concern was predictive of intentions to drug drive again in the future (see below), and thus it is likely that individuals who are worried about their peers' perceptions are the group least likely to engage in the aberrant driving behaviour. However, given that almost a third of the sample reported being a passenger in a car whilst the driver was under the influence of drugs in the preceding six months, the results suggest that some peer groups may yet be found to promote rather than prohibit such offending behaviours. It is not surprising that peer approval or disapproval may be most salient among younger groups, and thus a social pro-offending network may yet be found to negate the deterrent threat from formal sanctions. Currently, what remains evident is that more research is required to determine what informal sanctions (if any) impact upon drug driving behaviour and how such forces can be manipulated to complement the deterrent potential of the oral fluid testing legislation.

Predictors of Intentions to Drug Drive

Finally, the study aimed to examine what perceptual and behavioural-based factors predicted intentions to drug drive again in the future. Firstly, having a lower perception of apprehension certainty was identified as a predictor of intending to drug drive in the future. This result is consistent with previous road safety research that has demonstrated a negative relationship (albeit weak) exists between perceptions of apprehension certainty and offending behaviours, although it is noted that the majority of research in this area has focused on drink driving rather than drug driving (Grosvenor, Toomey & Wagenaar, 1999; Homel, 1988; Piquero & Paternoster, 1998). Despite this, it will also be of relevance to explore whether motorists' perceptions of the probability of apprehension increase with the growth and expansion of random roadside drug testing in the future, as the current preliminary finding provides support for the expansion of the countermeasure in regards to targeting motorists' perceived certainty of apprehension. However as highlighted above, it is noteworthy that a considerable proportion of the sample did not

consider the likelihood of apprehension as high, and such perceptions appear directly linked with offending behaviours.

Interestingly, concern about informal sanctions was also found to be predictive of being less likely to drug drive in the next six months, although as highlighted above, a considerable proportion of the sample were unconcerned about their peers' views and/or reported being a passenger in a vehicle after the operator had consumed illicit substances. Despite this, it is promising that some younger drivers are concerned about informal sanctions to an extent that it is negatively associated with intending to drug drive in the future. The findings warrant further research to determine whether social sanctions (and possibly the failure of such sanctions) are age specific (Piquero & Pogarsky, 2002). In particular, the application of models that include social aspects such as experiential and vicarious experiences (Stafford & Warr, 1993) may prove beneficial within further research projects that attempt to highlight factors contributing to offending behaviours.

However, it is noteworthy that the above perceptions were less influential predictors of intentions to drug drive in the future when compared with having: i) drug driven in the last six months or ii) overall self-reported drug consumption. In relation to past offending behaviours, similar with previous road safety research that has focused on drink driving (e.g., Freeman et al., 2006), past behaviour remains an efficient predictor of future behaviour. To a further extent, it may yet be found that drug driving while avoiding detection (e.g., punishment avoidance) may have a powerful influence on further offending behaviour, and research has found such evidence with other road safety concerns such as drink driving (Freeman & Watson, 2006; Piquero & Paternoster, 1998). To some extent, habitual or regular behaviours may counteract (or negate) the deterrent impact of proposed countermeasures, as committing an offence and avoiding apprehension is likely to be a strong reinforcer to engage in further offending behaviour among some groups.

In addition to past offending behaviour, a combined measure of regular drug consumption was also found to be a predictor of future intentions to drug drive, and also to a greater extent than perceptual deterrence based factors. This is again to be expected,

given that regular drug consumption within a community that arguably places great value on regular vehicle-based travel is likely to increase the probability of combining the two activities. And for other traffic-related offending behaviours such as drink driving, offenders' alcohol consumption was the best predictor of future recidivism (Yu, 2000). While dependence-based issues was not an investigative aim of the current program of research, it is also noteworthy that research has demonstrated that addiction prevents individuals making rational choices, regardless of the impact of possible sanctions (Yu, Evans & Clark, 2006). On a different note, the findings also indicate the deleterious effect that drug consumption may have not only on deterrence but also road safety. As such and consistent with similar research within the drink driving field (Baum, 1999; Yu, 2000), heavier consumption patterns increases the risk of committing offences and deterrence-based initiatives alone may not be enough to create behavioural among some offenders.

A number of limitations associated with the study should be taken into account. Firstly, participants were not randomly selected, but rather a snow-balling technique was utilised which may limit the representativeness of the sample. Secondly, the largest proportion of the sample can be considered to be younger drivers, and thus may not reflect the wider driving population. Thirdly, the collected data could have been influenced by self-reporting bias, in particular responses that involve the admission of offending behaviours. Fourthly, stated intentions may not always be indicative of future behaviours.

Notwithstanding such limitations, the study findings provide some preliminary insight into the competing forces that may influence younger motorists' drug driving behaviours in an environment which includes the early implementation of oral fluid testing mechanisms. In short and in regards to perceptual deterrence factors, the results suggest that lower perceptions of apprehension certainty and reduced concern regarding the application of informal sanctions may promote drug driving behaviour. This finding provides support for the expansion of the testing regime to increase perceptions of apprehension certainty within the community as well as initiate complementary education programs that highlight the significant crash risks associated with drug driving

behaviours. However, it is noted that drug driving in the recent past as well as the frequency of actual drug consumption behaviours were in fact identified to have a greater impact upon intentions to offend in the near future. These results not only highlight the deleterious effect that drugs have on the processes of deterrence, but also reinforce the enormity of the challenge to change drug driving behaviours among some groups of motorists. Such behavioural change is likely to be found through extensions beyond purely intelligence-led deterrence-based countermeasures, but rather initiatives that consider multi-modal interventions, in particular education schemes that incorporate core health messages regarding the range of negative consequences that follow illicit drug consumption.

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