RANDOM ROADSIDE DRUG TESTING: A STUDY INTO THE PREVALENCE OF DRUG DRIVING IN A SAMPLE OF QUEENSLAND MOTORISTS

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ABSTRACT

Random road-side drug testing is becoming increasingly prevalent in a number of Australian states and overseas jurisdictions. This paper outlines research conducted to provide an estimate and comparison of the extent of drug driving in a sample of Queensland drivers in regional and metropolitan areas. Oral fluid samples were collected from 781 drivers who volunteered to participate at Random Breath Testing (RBT) sites in a large Queensland regional area. Illicit substances tested for included cannabis (delta 9 tetrahydrocannibinol [THC]), amphetamine type substances, heroin and cocaine. Drivers also completed a self-report questionnaire regarding their drug-related driving behaviour. Samples that were drug-positive at initial screening were sent to a government laboratory for confirmation. Oral fluid samples from 27 participants (3.5%) were confirmed positive for at least one illicit substance. The most common drugs detected in oral fluid were cannabis (delta 9 THC) (n = 13) followed by amphetamine type substances (n = 11). A key finding was that cannabis was also confirmed as the most common self-reported drug combined with driving and that individuals who tested positive to any drug through oral fluid analysis were also more likely to report the highest frequency of drug driving. Furthermore, a comparison between drug vs drink driving detection rates for the study period revealed a higher detection rate for drug driving (3.5%) vs drink driving (0.8%). This research provides evidence that drug driving is relatively prevalent on Queensland roads, and may in fact be more common than drink driving. The paper will further outline the study findings and present possible directions for future drug driving research.

1. Introduction

Presently, there is an increasingly amount of research effort focused on determining the prevalence and impact of drug driving on public roads. A considerable body of literature is accumulating that has focused on detecting the presence of drugs in body fluids of those who have been involved in a crash (del Rio, Gomez, Sancho & Alvarez, 2002; Drummer et al., 2003; Seymour & Oliver, 1999; Swann, Boorman & Papafotiou, 2004). Such research has indicated that between 8.8 and 39.6% percent of drivers fatally injured in crashes have drugs detected in their body fluid (del Rio et al., 2002; Drummer et al., 2003; Mura et al., 2006; Seymour & Oliver, 1999; Swann et al., 2004), and drugs have been detected in 2.7 to 41.3 percent of non-fatally injured drivers in traffic crashes (Athanaselis et al., 1999; Longo et al., 2000). From this, research has found a strong association between drug driving and culpability, with their accident risk estimated as high as a driver with a blood alcohol content of 0.1 to 0.15 percent (Drummer, Gerostamoulos, Batziris, Chu, Capelhorn, Robertson & Swann 2003). More recently, research has demonstrated that cannabis is becoming increasingly associated with vehicle crashes (Mura et al., 2006).

However, currently questions remain regarding the prevalence of individuals who engage in drug driving practices and have yet to be apprehended or involved in a crash. The main avenue for obtaining such data has been through self-report data provided by motorists (del Rio et al., 2002; AAMI, 2004; Adalf, Mann & Pagalia, 2003; Boase et al., 2004; Davey & French, 2002; Davey & Richards, 2004; Jones, Donnelly, Swift & Weatherburn, 1999; Lenton & Davidson, 1999), and information from different motoring groups is increasingly being collected such as: general drivers (del Rio et al., 2002; AAMI, 2004; Adlaf et al., 2003; Boase et al., 2004), truck drivers (Davey & Richards, 2004); illicit drug users (Davey & French, 2002); and people who have attended dance parties (Lenton & Davidson, 1999; Cheng et al., in press). However, the self-reported prevalence of drug driving has varied markedly between 2 and 90 percent of respondents, although most research suggests between 3% and 10% (Kelly, Darke & Ross, 2004). This variation is dependent upon whether respondents have been referring to drug driving in general or to a specific substance. Despite this, research is generally indicating that the most common drugs combined with driving are usually cannabis (Davey et al., in press; Mura et al., 2006), and less commonly heroin and amphetamines (Davey et al., in press), although it is noted that a limitation of this body of research is that such studies have predominantly consisted of cannabis users. In regards to cannabis consumption, research Australian research has indicated that 80% of a sample of New South Wales motorists reported that cannabis was the drug they combined with driving on their last drug driving occasion (Hawkins, Bryant & Zipparo, 2004).

In contrast, research studies that have included the collection of body fluids have predominantly involved drivers who are already suspected of driving under the influence of alcohol and/or drugs. Therefore, questions remain regarding the extent of drug driving among general motorists who have not been apprehended or come in contact with the law. However, the most promising direction in obtaining a true estimate of the prevalence of drug driving on public roads appears to be associated with new detection and prevention countermeasures. The recent development of oral fluid drug testing mechanisms has dramatically increased the likelihood of accurately detecting the prevalence of drugs in individuals and thus detecting motorists who drive after consuming illicit substances.

For example, the use of oral fluid in drug testing is particularly advantageous for roadside use, as sample collection is relatively simple and non-invasive (Dolan, Rouen & Kimber, 2004; Speedy, Baldwin, Hand & Jehanli, 2004). From an enforcement perspective, collection of oral fluid samples can be supervised without causing undue embarrassment to the participant, as well as making the sampling technique resistant to tampering or adulteration (Dolan et al., 2004; Verstraete, 20004). Furthermore, oral fluid analysis is useful in detecting very recent drug use, as this technique identifies the presence of the free, unbound parent drug(s) (Dolan et al., 2004; Speedy et al., 2004; Verstraete, 20004).

Currently, a number of drug testing trials are underway in different countries and preliminary research has produced positive results in regards to the possible detection of drugged drivers. For example, one of the few studies in this area reported that among a random sample of non-crash involved drivers in Britain, 4.7 percent of drivers provided drug-positive samples (Buttress, Tunbridge, Oliver, Torrance & Wylie, 2004). MORE However, to date there is little published data available for Australian drivers.

As a result, the aims of this study were to:

- Measure the prevalence of drug driving among a sample of Queensland drivers,

- Investigate the self-reported frequency of general motorists' involvement in drug driving behaviour; and
- Independently assess the reliability of current mobile drug screening technology.

2. METHOD

2.1 Participants, Materials and Procedure

Drivers stopped at Random Breath Testing operations across a large regional area of Queensland were approached and asked by operational police to participate in the drug driving research, which was positioned on average 50 metres further down the road. Participation was voluntary and involved completing a self-report questionnaire regarding recent illicit drug use and drug driving in the previous 12 months, and providing a sample of oral fluid that could later be screened for the presence of drugs. The procedure took approximately 10-20 minutes to complete and drivers received a one-off payment of $20 cash to reimburse them for their time. Data was collected over a two month period, on ten separate occasions, usually between the hours of 5pm and 1am, as Workplace health and safety requirements resulted in the current roadside project only being implemented with the presence of the Queensland Police Service. RBT operations were deemed to be the most compatible roadside activity and thus drug testing procedures corresponded within traditional RBT operational hours e.g., 5pm – 1am.

A 12 item self-report questionnaire was designed to assess a variety of demographic data (e.g., gender, age, years driving) as well as self-reported drug use and the frequency of drug driving behaviour. Participants responded to questions that investigated the most recent use of marijuana / cannabis (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). This question was repeated for meth / amphetamine type substances (such as speed, oil, base, crystal), heroin and cocaine. Participants were also required to indicate how often in the previous 12 months they had operated a motor vehicle (including a motorcycle) within four hours of using marijuana / cannabis (every day, more than once a week, about once a week, 11 – 20 times, 3 – 10 times, once or twice, never). Once again, this question was repeated for meth / amphetamine type substances (such as speed, oil, base, crystal), heroin and cocaine. The majority of data was descriptive and/or categorical, and recorded as percentage frequencies, and thus, chi-square tests were performed where appropriate.

In addition, oral fluid samples were collected, stored and screened off-site at a later date using the Cozart® RapiScan oral fluid drug test device. Participants provided a sample of oral fluid that was collected from inside their mouth via a pad held either under their tongue or beside the inside of their cheek. The five-panel cannabis and single-panel methamphetamine / MDMA test cartridges were used (i.e. each sample was screened twice). Each Cozart® RapiScan kit consisted of a collector, transport tube containing buffer solution, separator filter tube, pipette and test cartridge. The five-panel cannabis cartridge detected the presence of benzodiazepines, amphetamine type substances, cannabis (THC), cocaine and opiates, while the single-panel methamphetamine / MDMA cartridge detected the presence of methamphetamine and MDMA (ecstasy). There was no subjectivity in the interpretation of results as the Cozart® RapiScan testing instrument displayed and printed results.

All drug-positive samples and a random group of negative samples were sent to a government laboratory for confirmatory analysis, specific drug type analysis, and to quantify the level of the drug(s) in the sample. Samples were analysed using Gas

Chromatography – Mass Spectrometry (GC-MS) (for cannabinoids and amphetamine type substances) and Liquid Chromatograph tandem Mass Spectrometer (LC/MS/MS) (for opiates and cocaine) techniques. Quantities of 0.2 to 0.4 millilitres of sample were used for each analysis.

3. RESULTS

3.1 Sample and Response Rate

A total of 781 motorists participated in the current study. Due to resourcing constraints and the referral process from the Police RBT site, it was not possible to obtain an accurate measurement of the response rate over the entire data collection period. The procedure usually consisted of RBT operational police officers informing motorists (who had given a breath sample) that they had the opportunity to participate in an anonymous research drug driving project being conducted approximately 100 metres down the road. However, on one occasion the response rate was assessed across two sites during a shift where an additional researcher counted the number of drivers approached to participate and noted their response. Drivers of 63 cars from a total of 85 participated in the project, resulting in a response rate of 74.12 percent. In addition, over the entire study, six potential participants approached the research site, but declined to participate after being informed about the research procedure.

In regards to participant characteristics, more than half the participants were male (n = 475, 61.6%), aged between 16 and 66 years (mean age = 26.35 years, SD = 10.46). On average, participants had been driving for 9.04 years (SD = 10.03). Most reported driving daily (n = 581, 75.7%) or three to five times per week (n = 156, 20.3%).

3.2 Prevalence of Positive Drug Tests

Firstly, laboratory confirmation revealed that oral fluid samples from 27 drivers (3.5% of the total sample) contained at least one illicit substance. Furthermore, a comparison with the corresponding drink driving detection rates for the RBT cites' associated with the research revealed a 0.8% apprehension rate, as 27 positive results were identified from 3,230 random breath tests conducted. Table 1 outlines the results by drug group detected and gender of the driver. As shown in Table 1, the most common drug detected was delta 9 THC only, followed by amphetamine type substances only, while samples from three drivers were consistent with polydrug use, as they contained both delta 9 THC and amphetamine type substances. When separated by gender, the prevalence of drug driving was higher among males than females. Similarly, only males were identified as poly drug users in the current sample of motorists.

More specifically, of the 14 samples that were confirmed positive for the presence of amphetamine type substances: two samples contained methylamphetamine only, four samples contained MDMA only, one sample contained methylamphetamine and MDMA, four samples contained methylamphetamine and amphetamine, and three samples contained methylamphetamine, MDMA and amphetamine. All of the 16 samples that were confirmed positive for the presence of cannabis (THC) contained delta 9 THC, which is the active component of cannabis associated with a drug-induced state. Furthermore, the presence of delta 9 THC in oral fluid indicates very recent use of cannabis, as it is metabolised out of the body within hours.

Compared with the total participant pool, the 27 drivers who provided samples that were confirmed positive for at least one illicit substance were more likely to be male (n = 23,

85.2%). However for the current sample, there were no significant differences between the groups on factors such as: age, years driving experience, and frequency of driving (e.g., daily, weekly), although it is noted that motorists who tested positive generally had less driving experience and were more likely to be aged between 17 and 30 years.

Table 1: Number and Proportion of Participants by Drug Group

	Total ***N* = 781**	**Males** ***N* = 475**	**Females** ***N* = 296**
Cannabis (THC) only	13 (1.7%)	12 (2.5%)	1 (0.3%)
Amphetamine Type Substances (ATS) only	11 (1.4%)	8 (1.7%)	3 (1.0%)
Polydrug Use (ATS & THC)	3 (0.4%)	3 (0.6%)	0
Total Illicit Substances	27 (3.5%)	23 (4.8%)	4 (1.4%)

3.3 Reliability of current mobile screening technology

Finally, an additional analysis was undertaken to confirm the accuracy and sensitivity of the drug testing apparatus utilised in the current study. Examination of the data revealed the accuracy of the Cozart® RapiScan device was 90.6 percent for positive samples (n = 30) and 100 percent for negative samples (n = 37). For example, three samples that were positive for amphetamine type substances at initial screening were not confirmed by the laboratory. All of the samples that were negative for all drugs at initial screening were subsequently confirmed as negative at the laboratory, or small concentrations of drugs were identified that were deemed below the detection cut-off of the Cozart® RapiScan device.

3.4 Self-reported Prevalence of Drug Driving

In addition to the analysis of body fluids, an investigation was also undertaken to examine participants' self-reported drug use and drug driving behaviours. Firstly for drug use, the most commonly consumed drug was cannabis, with 26.6% reporting the use of the substance within the last year, and 10% of this group reporting usage in the last week. In contrast, only 8.1% reported amphetamine use in the last year, with 1.9% using the substance in the last week. Finally, 2.3% reported using cocaine and 0.4% of the sample reported using heroin during the last year. Chi-square analysis revealed males were more likely to report regular cannabis use than females X^2 (6, N = 781, = 21.71, p = .001), while small cell sizes precluded analysis of the other substances.

For drug driving, similar to the above findings, the most common substance combined with driving was cannabis (see Table 2). Specifically, 4.7% reported using cannabis before driving at least once a week, while less than 1.0% reported the use of amphetamines, cocaine or heroin before driving. Finally, examination of the self-reported drug use for the 27 individuals who tested positive to the presence of drugs revealed that drug driving was most common among these individuals. For example, 21 (84%) reported driving within four hours of using at least one of the drugs outlined on the questionnaire. This proportion is more than four times the proportion of the total sample of 782 drivers that reported drug driving (134 drivers, 18%). In addition, fourteen (51.9%) of the drivers who provided samples that were confirmed positive for at least one illicit substance reported drug driving

frequently (that is, once a week or more). This is more than 10 times the proportion of the total sample that reported frequently drug driving (39 drivers, 5%).

Finally, while conducting between-group differences was not possible due to the unequal samples sizes, participants who tested positive to illicit drugs also reported a higher frequency of drug driving after consuming: (a) cannabis, (b) amphetamines and (c) cocaine.

Table 2: Drug Driving Behaviour

Drug Type	Cannabis		Amphetamine		Cocaine		Heroin	
	n	%	*n*	%	*n*	%	*n*	%
Drug Driving								
Every day	14	(1.8)	1	(0.1)	1	(0.1)	1	(0.1)
More than once week	13	(1.6)	2	(0.3)	2	(0.3)	0	(0.0)
About once a week	10	(1.3)	3	(0.4)	0	(0.0)	0	(0.0)
11 - 20 times	9	(1.1)	8	(1.0)	0	(0.0)	0	(0.0)
3 - 10 times	15	(1.9)	5	(0.6)	0	(0.0)	0	(0.0)
Once or twice	63	(8.3)	17	(2.1)	0	(0.0)	2	(0.3)
Never	632	(84)	722	(95.5)	755	(99.6)	755	(99.6)

4. Discussion

This paper aimed to report on an investigation into the prevalence of drug driving in a sample of Queensland motorists. Specifically, the study focused on measuring the prevalence of drug driving in the community, the major drug types that may be used when driving, and the reliability of current mobile drug screening technology.

4.1. Prevalence of Positive Drug Tests

The first major finding of the study was that the examination of oral fluid samples revealed that 3.5% (n = 27) of the sample provided a positive illicit drug reading. The finding is consistent with one of the few studies in this area that reported approximately 4.7% of non-crash involved drivers provide positive drug samples (Buttress et al., 2004) and that drug users often drive soon after consuming illicit drugs (Albery et al., 2000). However, a comparison with the corresponding drink driving detection rates for the associated RBT cite revealed a greater percentage of identified drug drivers than drink drivers (3.5% vs. 0.8%). While the results are only preliminary, the findings that a greater proportion of drivers may be at risk of driving under the influence of drugs, rather than alcohol, in the early hours of the morning. Furthermore, considering that previous research has indicated that perceptions of apprehension certainty are a key element in deterring both drink drivers (Piquero & Pogarsky, 2002) and drug drivers (Davey et al., 2005) from engaging in such offending behaviours, drug testing through saliva techniques has the potential to become a viable method to increase perceptions of apprehension certainty and thus reduce driving under the influence of illicit drugs. In fact, recent Australian research has indicated that increasing the perceived certainty of apprehension among drug drivers is likely to have the greatest deterrent impact upon their offending behaviour (Jones, Donnelly, Swift & Weatherburn, 2006). As a result, one of the next steps may include examining motorists' current perceptions regarding the likelihood of being detected for drug driving, and their corresponding beliefs about the effectiveness, and impact, of saliva testing on offending rates.

In the current study, drivers who tested positive to drug use were predominantly male and were under the age of 30. Furthermore, only two types of drugs were detected: (a) cannabis (delta 9 THC) and (b) amphetamine type substances. Of note was that more than half of the samples confirmed positive for the presence of amphetamine type substances contained more than one substance. One possible explanation for the detection of more than one amphetamine type substance in a number of samples is more likely the result of the manufacture of the drug used (such as ecstasy) as opposed to use of multiple drugs. In addition, it is noteworthy that amphetamine is a metabolite of methamphetamine and hence could be detected when only the latter is taken. Further research appears required to examine what percentage of motorists engage in poly drug use before driving.

An analysis undertaken to examine the reliability of the Cozart® RapiScan device utilised in the current study revealed a relatively high level of accuracy with 90.6% for positive samples (n = 30) and 100% for negative samples (n = 37). The slight variance in positive samples may be due to a number of factors. Firstly, it is noted that the samples were frozen (i.e., packed on ice for preservation) after collection, and were therefore thawed before initial screening. Secondly, there was also some delay between the initial screening and laboratory confirmation i.e., 2 – 6 weeks. As a result, it is anticipated that the three false positive results in this study were more likely the result of the procedures implemented in this project rather than limitations of the technology. Despite the data collection difficulties, initial results of the mobile screening technology appear to suggest the device may be relatively robust and has the potential to be utilised as a drug screening method. However, further research is required to determine the sensitivity of the technology with different drug groups, as preliminary evidence suggests the device is able to detect amphetamine type substances more easily than THC due to lower minimum levels of detection for amphetamine type substances and the amount of time the drugs remain in oral fluid.

Examination of the self-reported data revealed that cannabis was the most frequently consumed illicit substance, and not surprisingly, was also the most frequent drug to be used when driving. The findings are similar to previous research that has indicated cannabis to be the most prevalent drug associated with driving (Drummer et al., 2003; Seymour & Oliver, 1999; Swann et al., 2004). Importantly, individuals who tested positive to the drug testing process also reported the highest rate of drug driving in recent times. As a result, the findings also provide preliminary evidence that positive drug testing outcomes highlight individuals at risk of regularly engaging in drug driving activity, and at some level, provide support for the reliability of the self-report data.

The studies limitations should be borne in mind when interpreting the findings. The results of the study may not be generalisable, as a regional sample from only one area of Queensland was utilised in the research project. It is possible that drug use and drug driving trends may vary by area, due to differences in the supply, demand, cost and potency of drugs. As a result, the program of research is being replicated with a larger scale to sample drivers from across Queensland, with urban, regional and rural samples. In addition, although a wide age range was observed, the sample was heavily skewed towards younger age groups (the median age was 22 years). It would have been ideal to have sampled a group of drivers more representative of all Queensland drivers, however due to the voluntary nature of the study and the time of data collection (e.g., late at night), this did not occur. It is possible, however, that the sample of this study is representative of drivers at night on weekends, which is when data collection was conducted. However, given that data

was only collected between the hours of 5pm and 1am, it is possible that drug driving rates may increase or decrease further into the early hours of the morning, as well as during the day. Furthermore, the possibility of volunteer bias remains, as approximately one in four drivers declined to participate, and although the Queensland Police Service were not directly involved in the research project, it is possible that operational officers presence at the research cite deterred some individuals from participating (especially those under the influence of drugs). Finally, a further limitation of this study was the delay between sample collection, screening and laboratory confirmation, which may have influenced the reliability of the collected samples. Unfortunately, it was beyond the scope of this study to screen the samples at the roadside due to resourcing constraints. While only three samples were not confirmed by the laboratory (which would suggest that this delay had a minimal effect on results), the true impact of this procedure is unknown and future research should attempt to minimise the delay between sample collection, screening and laboratory confirmation.

Despite such limitations, the study has provided valuable information regarding the drug use and drug driving behaviour of a sample of drivers. Perhaps one of the most surprising finding of this study was that people who had used drugs recently still volunteered to participate in the research. When considered in conjunction with the high response rate of the study, this suggests that it is possible to obtain a valid estimate of the incidence of drug driving in the community using a volunteer sample when the anonymity of participants is assured. As a result, further examination into drug use and drug driving can only prove beneficial in regards to both detecting and deterring drug driving.

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