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**Screening for Drugs in Oral Fluid:
Illicit Drug Use and Drug Driving in a Sample of Queensland Motorists**

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Abstract

Introduction and Aims: Police Services in a number of Australian states have indicated random roadside drug testing will be implemented to target drug driving. This paper outlines research conducted to provide an estimate of the prevalence of drug driving in a sample of Queensland drivers.

Design and Methods: 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 tetrahydrocannabinol [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.

Results: 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%).

Discussion and Conclusion: This research provides evidence that drug driving is relatively prevalent on Queensland Roads. The paper will further outline the study findings and present possible directions for future drug driving research.

Introduction

The role of alcohol in road crashes is well documented, and through enforcement practices such as Random Breath Testing, estimations have been obtained regarding the proportion of the general driving population (who are not involved in crashes) that continue to drive after consuming alcohol. In contrast, the prevalence of drug involvement in crashes, and the proportion of the general driving population (who are not involved in crashes) that are driving after consuming drugs remain limited. It has been argued that one of the primary reasons for this discrepancy is the difficulty associated with identifying and measuring drug use by drivers, as the process is considerably more complex than alcohol analysis [1]. In addition, a variety of drugs can influence driving performance, and each drug type requires a specific test [1].

At present, the majority of previous research that has attempted to examine drug driving for different driver groups has focused predominately on samples of body fluids from individuals involved in crashes [2-5]. Research indicates that between 8.8 and 26.7 percent of drivers fatally injured in crashes have drugs detected in their body fluid [2-5]. In addition, drugs are detected in 2.7 to 41.3 percent of non-fatally injured drivers in traffic crashes [6,7].

In contrast, considerably less data is available for non-crash involved drivers, and the majority of this data tends to be self-reported [1, 8- 15]. A number of Australian and Canadian studies have implemented self-report drug driving surveys within a variety of different samples, including: illicit drug users [12]; truck drivers [13]; people who have attended “rave” dance parties [15]; and general drivers [1,8, 9, 10, 11]. Self-reported frequency of drug driving for illicit drug users varies between two and 90 percent of respondents, and is largely dependent on whether participants were responding generally or with reference to a specific drug. The most common drugs are usually cannabis, heroin and amphetamines, however a limitation of this research is that the majority of previous studies have only sampled cannabis users.

Alternatively, studies involving body fluid sample analysis predominantly involve samples of drivers suspected of driving under the influence of alcohol and/or drugs, while very few published studies have analysed body fluid samples from a sample of drivers. 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 [16]. However, to date there is no such data available for Australian drivers. While it is recognised that the Victorian Police Service trial of random roadside drug testing is currently underway, at the time of publication, scientific data was not publicly available.

Roadside detection using oral fluid samples

It has been argued that advances in testing for drugs in oral fluid are “fundamental to the introduction of on-site, and in particular, roadside testing”, with the time taken to collect a sample appropriate for a roadside test [17]. The use of oral fluid in drug testing is particularly advantageous for roadside use, as sample collection is relatively simple and non-invasive [17,18]. From an enforcement perspective, collection of oral fluid samples can be supervised without causing embarrassment to the participant, making the sampling technique resistant to tampering or adulteration, while preserving the dignity of the participant [17-19]. Oral fluid analysis is useful in detecting very recent drug use, as this technique detects the presence of the free, unbound parent drug(s) [17-19].

Current project objectives

In summary, a further review of the drug driving literature concluded that the drugs detected in impaired drivers usually reflect the general drug use patterns of the community in which the studies were conducted [20]. Therefore the drugs that will pose the greatest risk to traffic safety in a given community, and any countermeasures implemented to reduce this risk, must be determined by the drug use patterns observed in that community. However, no such data is available for Queensland

drivers. For example, in an issues paper on drug driving in Queensland, the Parliamentary Travelsafe Committee identified the need for research to “establish the patterns of drug use by Queensland drivers” [21, 1998, p. 10].

As a result, the major objectives 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.

Method

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 1am¹.

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,

¹ 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.

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.

RESULTS

Sample and Response Rate

A total of 781 motorists participated in the 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 period². 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.

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%).

Prevalence of Positive Drug Tests

Laboratory confirmation revealed that oral fluid samples from 27 drivers (3.5% of the total sample) contained at least one illicit substance. However, a comparison with the corresponding drink driving detection rates for the associated RBT site revealed a 0.8% apprehension rate, as 27 positive results were identified from 3,230 random breath tests conducted³. Table 1 outlines the results by drug group detected and gender of the driver. As depicted in Table 1, the most common drug detected was delta 9 THC only, followed by amphetamine type substances only, while samples

² 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.

³ Relatively few individuals charged with drink driving participated in the drug driving research, and thus the drug and drinking drivers consisted of separate samples.

from three drivers were consistent with polydrug use, as they contained both delta 9 THC and amphetamine type substances. When separated by gender (where gender was known), the prevalence of drug driving was higher among males than females. All polydrug users were male.

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%), and aged between 17 and 30 (mean = 22.48 years, $SD = 3.92$), and had less driving experience than the sample average (mean = 5.73 years, $SD = 4.38$). Frequency of driving was similar, as most reported driving daily ($n = 22$, 84.6%) or three to five times per week ($n = 3$, 11.5%).

INSERT TABLE 1 HERE

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.

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%).

INSERT TABLE 2 HERE

DISCUSSION

This paper aimed to report on an investigation into the incidence of drug driving in a Queensland region. Specifically, the study focused on measuring the self-reported 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.

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 [16]. 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. Whilst only preliminary, the results suggest 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 [22] and drug drivers [23] 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. 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, these drivers were predominantly male and were under the age of 30. Two types of drugs were detected: cannabis (delta 9 THC); and amphetamine type substances. Also 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.

Reliability of current mobile screening technology

The Cozart® RapiScan device is an on-site test designed to screen samples at the point of collection. An analysis undertaken to examine the reliability of the drug testing apparatus 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.

Self-reported Prevalence of Drug Driving

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 support previous research that has indicated cannabis to be the most prevalent drug associated with driving [3-5]. In addition, individuals who tested positive to the drug testing process also reported the highest rate of drug driving. 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.

Limitations

However, some methodological limitations associated with the program of research 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 therefore, drug driving) trends may vary by area, due to differences in the supply, demand, cost and potency of drugs. It is therefore recommended that this research be replicated on a larger scale to sample drivers from across Queensland, with urban, regional and rural samples. Such information will assist in the development and implementation of effective countermeasures to combat drug driving. Further, 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, 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 site deterred some individuals from participating (especially those under the influence of drugs). Questions also remain about the accurateness of saliva testing for illicit drugs, as environmental contamination may negatively affect the accuracy of oral testing e.g., presence in a room where cannabis is being smoked. 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.

Taken together, this was an innovative project as it was the first Australian study to provide valuable information regarding the drug use and drug driving behaviour of a sample of drivers that, to date, has been lacking in the drug driving literature. The interception of participants while engaged in the driving task was also unique. Perhaps 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. Also, the collection of two types of data (i.e. self-report and oral fluid samples) permitted the researchers to objectively assess the accuracy of the self-report data provided by participants. Relying on self-report data alone can be problematic when researching illegal or sensitive behaviours, particularly in close proximity to the Police (as was the case in this study), as participants may be motivated to conceal their behaviour. Despite this,

matching self-report data to results of oral fluid sample analysis in this study revealed that participants' self-reported responses were relatively reliable. In summary, further examination into drug use and drug driving can only prove beneficial to policy development, and the design of effective countermeasures and enforcement practices aimed at reducing the impact of this growing road safety problem.

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References

- [1] Beirness, D.J., Simpson, H.M. & Desmond, K. *The Road Safety Monitor 2002: Drugs and Driving 2003*. Ottawa, Ontario: Traffic Injury Research Foundation.
- [2] del Rio, M.C., Gomez, J., Sancho, M. & Alvarez, F.J. Alcohol, illicit drugs and medicinal drugs in fatally injured drivers in Spain between 1991 and 2000. *Forensic Science International* 2002; 127: 63-70.
- [3] Drummer, O.H., Gerostamoulos, J., Batziris, H., Chu, M., Caplehorn, J.R.M., Robertson, M.D. & Swann, P. The incidence of drugs in drivers killed in Australian road traffic crashes. *Forensic Science International* 2003; 134: 154-162.
- [4] Seymour, A. & Oliver, J.S. Role of drugs and alcohol in impaired drivers and fatally injured drivers in the Strathclyde police region of Scotland, 1995-1998. *Forensic Science International* 1999; 103: 89-100.
- [5] Swann, P.D., Boorman, M.C. & Papafotiou, K. Impairment and driving assessments of drivers given amphetamines, cannabis and benzodiazepines and oral fluid testing results. *Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004*.
- [6] Athanaselis, S., Dona, A., Papadodima, S., Papoutsis, G., Maravelias, C. & Koutselinis, A. The use of alcohol and other psychoactive substances by victims of traffic accidents in Greece. *Forensic Science International* 1999; 102: 103-109.
- [7] Longo, M.C., Hunter, C.E., Lokan, R.J., White, J.M. & White, M.A. "The prevalence of alcohol, cannabinoids, benzodiazepines and stimulants amongst injured drivers and their role in culpability. Part I: The prevalence of drug use in drivers, and characteristics of the drug-positive group". *Accident Analysis & Prevention* 2000; 32: 613-622.
- [8] AAMI. *Young drivers index*. Sydney: AAMI, 2004.

- [9] Adlaf, E.M., Mann, R.E. & Paglia, A. Drinking, cannabis use and driving among Ontario students. *Canadian Medical Association Journal* 2003; 168(5), 565-566.
- [10] Boase, P., Jonah, B., Mann, R.E., Brands, B., Macdonald, S. & Stoduto, G. Cannabis and road safety in Canada: Evidence on the prevalence of cannabis use and driving; Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004.
- [11] Centre for Addiction and Mental Health (CAMH). Cannabis use and driving among Ontario adults; Toronto, Ontario: CAMH Population Studies eBulletin, 20, CAMH, 2003.
- [12] Davey, J. & French, N. They don't test for it – so I do it': Drug driving from a user's perspective; Proceedings of the 16th International Conference on Alcohol, Drugs & Traffic Safety, Montreal, Canada, 87-93, 2002.
- [13] Davey, J.D. & Richards, N.L. Illicit drug use and driving by Australian long haul truck drivers: Reform starts with rehabilitation; Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004.
- [14] Jones, C., Donnelly, N., Swift, W., & Weatherburn, D. Driving under the influence of cannabis: The problem and potential countermeasures. *Crime and Justice Bulletin* 2005; 87.
- [15] Lenton, S. & Davidson, P. Raves, drugs, dealing and driving: Qualitative data from a West Australian sample. *Drug and Alcohol Review* 1999; 18: 153-161.
- [16] Buttress, S.C., Tunbridge, R.J., Oliver, J.S., Torrance, H. & Wylie, F. The incidence of drink and drug driving in the UK – A roadside survey in Glasgow; Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004.
- [17] Speedy, T., Baldwin, D., Hand, C. & Jehanli, A. An integrated device for the collection, roadside and laboratory-based testing of oral fluid for drugs of abuse. Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004.

- [18] Dolan, K., Rouen, D. & Kimber, J. An overview of the use of urine, hair, sweat and saliva to detect drug use. *Drug and Alcohol Review* 2004; 23: 213-217.
- [19] Verstraete, A.G. Recent developments in roadside drug testing. Proceedings of the 17th International Conference on Alcohol, Drugs & Traffic Safety, Glasgow, UK, 2004.
- [20] Kelly, E., Darke, S. & Ross, J. A review of drug use and drug driving: epidemiology, impairment, risk factors and risk perceptions. *Drug and Alcohol Review* 2004; 23: 319-344.
- [21] Parliamentary Travelsafe Committee. "*Drug driving in Queensland*". Issues Paper Number 3, Brisbane, Queensland: Parliamentary Travelsafe Committee, 1998.
- [22] Piquero, A.R., & Pogarsky, G. Beyond Stafford and Warr's reconceptualization of deterrence: personal and vicarious experiences, impulsivity, and offending behavior. *Journal of Research in Crime and Delinquency* 2002; 39 (2): 153-186.
- [23] Davey, J., Davies, A., French, N., Williams, C. & Lang, C. Drug Driving From a Users Perspective. *Drugs: Education, Prevention and Policy* 2005; 12(1): 61-70

Tables

Table 1. *Number and Proportion of Participants by Drug Group*

	Total⁴ 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
<i>Total Illicit Substances</i>	27 (3.5%)	23 (4.8%)	4 (1.4%)

Table 2. *Drug Driving Behaviour*

Drug Type	Cannabis		Amphetamine		Cocaine		Heroin	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
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 10 respondents did not provide their gender.