Accepted Manuscript

Title: Results of the Queensland 2007-2012 roadside drug testing program: The prevalence of three illicit drugs

Author: Jeremy Davey Kerry Armstrong Peter Martin

PII: S0001-4575(13)00504-6
DOI: http://dx.doi.org/doi:10.1016/j.aap.2013.12.007
Reference: AAP 3365

To appear in: *Accident Analysis and Prevention*

Received date: 17-10-2013
Revised date: 10-12-2013
Accepted date: 11-12-2013

Results of the Queensland 2007-2012 roadside drug testing program: The prevalence of three illicit drugs

Jeremy Davey Centre for Accident Research and Road Safety–Queensland (CARRS-Q)
130 Victoria Park Road, Kelvin Grove, QLD 4059, Australia
Email: j.davey@qut.edu.au

Kerry Armstrong Centre for Accident Research and Road Safety–Queensland (CARRS-Q)
130 Victoria Park Road, Kelvin Grove, QLD 4059, Australia
Email: ka.armstrong@qut.edu.au

Peter Martin Queensland Police Service
Address withheld for privacy reasons.
Martin.PeterJ@police.qld.gov.au

Corresponding author

Kerry Armstrong
Telephone: +61 7 3138 8418
Fax: +61 7 3138 0111

Highlights

- First review of drug driving detection in Queensland, Australia
- Detection rates have almost doubled since inception December 2007
- Highlights the importance of regional, age and gender and detection of drug driving

ABSTRACT

The purpose of this investigation is to present an overview of roadside drug driving enforcement and detections in Queensland, Australia since the introduction of oral fluid screening. Drug driving is a problematic issue for road safety and investigations of the prevalence and impact of drug driving suggest that, in particular, the use of illicit drugs may increase a driver's involvement in a road crash when compared to a driver who is drug free. In response to the potential increased crash involvement of drug impaired drivers, Australian police agencies have adopted the use of oral fluid analysis to detect the presence of illicit drugs in drivers. This paper describes the results of roadside drug testing for over 80,000 drivers in Queensland, Australia, from December 2007 to June 2012. It provides unique data on the prevalence of methamphetamine, cannabis and ecstasy in the screened population for the period. When prevalence rates are examined over time, drug driving detection rates have almost doubled from around 2.0% at the introduction of roadside testing operations to just under 4.0% in the latter years. The most common drug type detected was methamphetamine (40.8%) followed by cannabis (29.8%) and methamphetamine/cannabis combination (22.5%). By comparison, the rate of ecstasy detection was very low (1.7%). The data revealed a number of regional, age and gender patterns and variations of drug driving across the state. Younger drivers were more likely to test positive for cannabis whilst older drivers were more likely to test positive for methamphetamine. The overall characteristics of drivers who tested positive to the presence of at least one of the target illicit drugs are they are likely to be male, aged 30-39 years, be driving a car on Friday, Saturday or Sunday between 6:00PM and 6:00AM and to test positive for methamphetamine.

Keywords: Drug driving; roadside drug testing; enforcement.

1. Introduction

Drug driving is a problematic issue for road safety in many jurisdictions around the world. Over the past decade, a considerable body of research has focused on ascertaining the prevalence and impact of driving under the influence of drugs (e.g., Albery et al., 2000; Drummer et al., 2003; Kuypers et al., 2012). Assessment of drug involvement for drivers involved in fatal and non- fatally injured vehicle crashes has provided an indication of the prevalence of drug driving. For example, the presence of drugs in bodily fluid of fatally injured drivers has been shown to range between 8.8% and 39.6% (del Río et al., 2002; Drummer et al., 2003; Drummer et al., 2004; Mura et al., 2006; Swann, Boorman, and Papafotiou, 2004) and between 2.7% and 41.3% for non-fatally injured drivers (Athanaselis et al., 1999; Longo et al., 2000). Investigations of the prevalence and impact of drug driving suggest that, in particular, the use of illicit drugs may increase a driver's involvement in a road crash when compared to a driver who is drug free. For example, Drummer et al. (2004) found that among a large sample of fatally-injured drivers, those who tested positive to the active constituent in cannabis (Delta-9-tetrahydrocannabinol [THC]) at 5ng/ml or greater were 6.6 times more likely to be culpable for a road crash than a drug free driver (95% CI OR 1.5-28.0). This finding is on par with the culpability of a driver with a blood alcohol concentration (BAC) of 0.15% or greater being involved in a crash compared to a driver with a BAC of 0.0%.

In response to the potential increased crash involvement of drug impaired drivers, Australian police agencies have adopted the use of oral fluid analysis to detect the presence of illicit drugs in drivers. This implementation has offered a unique opportunity to examine the incidence and characteristics of drug driving across the community via the examination of large data sets. Numerous studies have shown that oral fluid testing is useful in detecting very recent drug use (Dolan, Rouen, and Kimber, 2004; Drummer et al., 2007; Walsh et al., 2004) and correlates reasonably well with blood concentrations (Toennes et al., 2005).

Results from roadside drug testing have revealed similar rates to those obtained from fatal and non-fatally injured drivers. For instance, one investigation revealed that among a random sample of non-crash involved drivers from Britain, 4.7% tested positive to the presence of a drug (Buttress et al., 2004). Wylie et al. (2005) found that among a German sample, 16.8% of drivers tested positive for at least one drug.

In Australia, Drummer et al. (2007) undertook an examination of drugs in oral fluid for over 13,000 Victorian drivers randomly tested for the presence of THC and methamphetamines and reported the overall drug positive rate to be 2.4% of the screened population. Similar findings were reported by Davey, Leal, and Freeman (2007) where they found 3.5% of the screened driving population tested positive to at least one illicit drug in rural Queensland, while Davey and Freeman (2009) found 3.7% in urban Queensland. Research from South Australia has reported an overall detection rate of 2.9% (see Thompson, 2008; Thompson, 2012) whereas examination of roadside drug testing in Western Australia reported a positive detection rate of 5.3% (Woolley and Baldock, 2009), while in New South Wales it has remained constant at 2.0% (Papafotiou and Boorman, 2011; Rowden et al., 2011).

In 2004, Victoria was the first Australian jurisdiction to implement a legislative framework to allow police to randomly stop drivers and collect a roadside oral fluid sample to assist in laying a drug driving charge. The purpose of this legislation is to provide police with an immediate roadside strategy for interdiction. More importantly, and in line with general Australian policing strategies for random breath alcohol testing, roadside oral fluid testing offers a platform for an effective on going deterrence strategy (Papafotiou and Boorman, 2011; Drummer et al., 2007). Roadside oral fluid drug testing programs have now been adopted by all Australian policing jurisdictions (see Table 1), with Queensland implementing roadside drug testing for methamphetamine (MA), 3,4-methylenediox-methamphetamine (MDMA), and cannabis (delta-9-tetrahydrocannabinol, THC) in December 2007. In Queensland, the penalty if detected via a roadside drug test is detailed in S79 (2AA) of the Transport Operations (Road Use Management) Act 1995 (Qld), which states a person is liable to a penalty not exceeding 14 penalty units ($110 AUD per penalty unit) or to imprisonment for a term not exceeding three months. As such, the maximum monetary penalty is currently $1,540 AUD with possible loss of licence for up to nine months for a first offence.

This paper describes the results of roadside drug testing for over 80,000 drivers in Queensland, Australia, from December 2007 to June 2012. It provides unique data on the prevalence of MA, THC and MDMA in the screened population for the period.

2. Method

2.1. Participants

The dataset contains information for all drivers stopped and processed as part of the Queensland roadside drug driving legislative framework from December 2007 to June 2012 (*N* = 80,624). The data collection occurred within the state's eight defined policing regions, covering the total Queensland population of 4,524,529 (see Table 3). The dataset was deemed exempt from the need for University Human Research Ethics Committee review, approval and monitoring in conformity with sections 5.1.22 and 5.1.23 of the National Statement on Ethical Conduct in Human Research (2007).

2.2. Roadside testing procedure

In Queensland, the drug screening process consists of two stages roadside as well as confirmatory analysis by the Queensland Government forensic laboratory. The first roadside stage involves a trained police officer intercepting a driver who undertakes a preliminary screen test using the Securetec DrugWipe II Twin oral fluid device. This test takes approximately five minutes to complete for MA, MDMA and THC. If the test results indicate a 'non positive' outcome, the driver is no longer detained. However, if the test indicates a positive result (on any of the screened drugs), the driver is requested to provide a second sample of oral fluid using the Cozart DDS805 2-panel methamphetamine/ THC test with Cozart DDS Reader DDS202S. If this test indicates the presence of one or more of the three legislated drugs (or the driver refuses or fails to provide an oral fluid sample), then the individual's driver licence is suspended for a period of 24 hours. Under the legislation all positive roadside oral fluid samples are then sent to the Queensland Government forensic laboratory for confirmation. It is from this laboratory analysis and confirmation that a charge of drug driving is issued.

Data relating to the number of operations and tests conducted are compiled regularly by the Queensland Police Service. For the purposes of this investigation, information relating to age, gender, vehicle type, and outcome of the confirmatory test from the Queensland Government laboratory were compiled for all drivers who tested positive using Cozart DDS805 2-panel methamphetamine/THC test with Cozart DDS Reader DDS202S at the roadside.

3. Results

3.1. Detection rate

In the period 1 December 2007 to 30 June 2012, 80,624 tests were conducted, with 2,139 positive detections at the roadside. However, 10 cases were later identified by the Queensland Government forensic laboratory as false positives, equating to 0.01% of total tests. As such, the total number of confirmed detections was N = 2,129 (2.7%).

Examination of the number of roadside tests conducted each year showed the greatest number of positive detections occurred in 2011 (see Table 2). It should be noted that 2007 and 2012 are not complete calendar years. Further, in 2011, the number of roadside tests more than doubled from the number conducted in 2009 and rose 16.0% compared to the number conducted in 2010. Table 2 also outlines the detection rate for each year which shows an increase in recent years, up from 1:50 in 2008 to 1:26 in 2012. It is interesting to note that the overall detection rate for oral fluid testing (1:38) is higher than alcohol breath testing (1:107).

Examination by testing operations across all of the eight police regions revealed the majority of roadside drug tests in the period were undertaken in the highly populated south east corner of the state (comprising the North Coast, South Eastern, Metro North and Metro South police regions). These four police regions cover 68.0% of the state population and cumulatively represent 64.0% of all roadside tests and 65.0% of positive tests (see Table 3). The region with the most total detections was South Eastern, followed by North Coast, then Southern region.

3.2. Analysis of positive detections

Of the cases confirmed positive (N = 2,129), there were 2,057 drug driving offenders detected in the period, with males (n = 1,772; 86.1%) considerably more likely to be detected than females (n =285, 13.9%).

Examination of number of detections and vehicle type revealed that most commonly, drivers were detected when driving a car, followed by a heavy vehicle, then a motorcycle (see Table 4). Examination of the proportion of detections by percentage of vehicles on register in Queensland as of June 2012 reveals that heavy vehicles are over-represented.

Examination of the distribution of positive tests and the detection rate across the days of the week revealed that over 75.0% of all tests were conducted between Thursday and Sunday; with Saturday resulting in the highest number of positive detections (see Table 5). Examination of time of day revealed that while the majority of tests were conducted during daylight hours (n = 26,212 between 6.00am to 11.59am; percentage detection = 2.0% and n = 27,390 between 12.00pm to5.59pm; percentage detection = 2.4%). However, when represented as a detection rate the period between midnight and 5:59am (n = 7,551 tests) resulted in the highest proportion of detections per overall test (4.5%), followed by the period between 6.00pm to 11.59pm (n = 19,471 tests; 3.0% detections).

3.3. Frequency of each drug detected

The frequency of drugs detected by way of oral fluid analysis is displayed in Figure 1. It can be seen that the majority of detections involved MA (40.8%), followed by THC (29.8%). There were 589 (27.7%) cases of polydrug driving, of which the majority was for the combination of MA and THC.

Examination of drug type detected by year is provided in Table 6. Across all years MA was the most common drug detected followed by THC and MA/THC combined. Interestingly, the rate of MA detections is twice as high as THC in 2008, whereas in 2009 the opposite is true with twice as many THC detections than MA. From 2010 onward this trend starts to reverse with MA again being the dominant drug detected. The rate of detection for MA/THC combination remained relatively consistent in 2008 and 2010-2012. MDMA and MDMA combinations account for a relatively very small number of detections.

Examination of drug type both between and within each Queensland police region was undertaken to determine if there was a different pattern of detection (see Table 7). Interestingly, strong regional variations were apparent. Examination within drug type revealed that the detection rate for MA to THC was approximately 2:1 in the Central, Metro South, South Eastern and Southern regions and approximately 3:1 in the Metro North region. Conversely, the detection rate for THC to MA was approximately 4:1 in the Far North region. Further, the lowest rate of MA/THC combination was also observed in the Far North Queensland police region.

Examination of drug type by gender revealed that the percentage of MA, MA/THC combination, MDMA and MDMA/THC combination detections was greater among females than males, whereas the percentage of THC detections was greater among males than females (see Figure 2).

Finally, examination of age revealed that the entire sample ranged from 17 to 63 (M = 33.19 years; SD = 9.59), with the highest proportion of detections seen in the 30-39 age group (32.4%), followed by the 40-49 (20.1%) and 25-29 (19.4%) age groups respectively (see Table 8). Examination of type of drug detected reveals an interesting pattern with younger cohorts (aged between 17 and 24 years) more often testing positive to THC followed by MA.

However as age increases the detection of MA increases to where it becomes clearly the dominant detected drug from the age of 25 onwards. The proportion of detection for MA/THC combination remains relatively stable from 17 to 49 years of age, where it then begins to decrease. Drivers under the age of 30 years were more likely than their older counterparts to be detected with MDMA, whether by itself or in combination with other drugs.

4. Discussion

The purpose of this investigation was to present an overview of roadside drug driving enforcement and detections in Queensland, Australia since the introduction of oral fluid screening. The roadside oral fluid detection program was introduced on 1 December 2007 and this is the first study to report on the complete data to date. The results from this investigation reveal that roadside oral fluid screening is an effective measure for detecting the presence of illicit drugs among motorists. As a result over 2,000 drivers in Queensland have been charged with drugged driving under the legislation between 1 December 2007 and 30 June 2012.

The three legislated drugs screened for on the roadside were MA, THC and MDMA and less than 0.01% of roadside tests were identified by Queensland Government forensic laboratory as false positive screens (additional information regarding false positives is unavailable due to privacy reasons). Interestingly, the detection rate for drug driving (RDT) in each year was higher than the corresponding yearly drink driving (RBT) detection rate. The combined detection rate for drug driving over the period for was 1:38, whereas the comparative RBT detection rate was 1:107. At first appearance this could indicate there are just as many, or substantially more drug drivers on Queensland roads as compared to drink drivers. Another possible explanation for the difference in detection rates has to do with the saturation enforcement approach to drink driving as opposed to a more targeted approach for RDT. For example, while there were approximately 25,000 RDT tests in 2011, there were almost 3,000,000 RBT tests in Queensland in the same year. The comparative high rate of RDT detections compared to RBT detections is an area for further investigation.

The overall characteristics of drivers who tested positive to the presence of at least one of the target illicit drugs are that they are likely to be male, aged 30-39 years, driving a car on Friday, Saturday or Sunday between 6.00pm and 6.00am and testing positive for MA. Analysis of the most common drug type detected revealed MA (40.8%) was most prevalent, followed by THC (29.8%) and MA/THC combination (22.5%). By comparison the rate of MDMA detection was very low (1.7%).

As the presence of the three same drugs are tested in a similar manner across all Australian jurisdictions, the overall rate and pattern of detection of the current study was compared to other jurisdictions where data was available. The detection rate of 2.7% found in the current study is higher compared to New South Wales (2.0%; see Rowden et al., 2011), South Australia (2.3%; see Thompson, 2008) and Victoria (2.4%; see Drummer at al., 2007); whereas the rate of detection in Western Australia is reportedly much higher compared with all other jurisdictions at 5.3% (see Woolley and Baldock, 2009). While this variability between the jurisdictions is likely reflective of enforcement practices, it is interesting to note that the pattern of detection remains the same with the greatest number of detections being recorded for MA, followed by THC and combinations with MDMA.

While the data shows that the most commonly detected drug on the roadside was MA the National Drug Household Survey (NDHS) (Australian Institute of Health and Welfare [AIHW], 2011) reports that MA is the third most commonly used illicit drug in the community (behind Cannabis and Ecstasy) with recent use peaking at 5.9% in the 20-29 year age group. Cannabis has consistently been reported in Australia as the most commonly used illicit drug with recent use highest in the 18-25 years age group where almost one in five report having used at least once in the past year (AIHW, 2011). In the overall analysis of the current roadside data, cannabis (THC) was found to be the second most common drug detected after MA. Arguably the general prevalence of MA over THC may be an effect of the difference in time windows of detection for the two drugs using the current roadside technology. Therefore the higher proportions of MA detections may not be reflective of usage, in terms of absolute numbers of users in the community, but rather the ability to better detect MA as compared to THC via saliva at the roadside. Consequently some drivers may not be detected, particularly for THC, when driving with concentration below the sensitivity of the cut off threshold for the roadside screening devices (Drummer et al., 2007).

What is also interesting when roadside detection data is compared to usage patterns reported in the NDHS (AIHW, 2011) is the relative low levels of detection of roadside MDMA compared to the comparative level of use in the community. The NDHS reports that MDMA/Ecstasy is the second most commonly used illicit drug in Australia with recent use peaking at just under 10.0% for the 20-29 years age group. However, in this roadside data MDMA by itself represented less than 2.0% of total detections. This differentiation may represent changed drug use patterns over time, differences between years in which surveys were undertaken, differences between numbers of people reported having ever used MDMA and more frequent use of MDMA, or may be a characteristic of different sampling methodologies between on the ground road side testing and broader based household surveying with comparatively small samples in specific regions. Roadside testing may also be more sensitive towards detecting local drug trends and patterns of usage. What is certain is that roadside testing can provide immediate local data on consumption behaviours that can be compared over time on a regional basis.

Examination of drug type detected in different police regions revealed an interesting pattern where Far Northern Queensland (regional area) showed a detection rate of four THC detections for every one MA detection, whereas the more populist metropolitan regions in the south east corner of the state returned a detection rate of approximately two MA detections for every one THC detection. As such, the location of the roadside drug testing operations can have a strong influence on the type of drug detected. Closer examination of the data also revealed different patterns associated with age and gender. For males, THC is more likely than any other drug to be detected in younger drivers under 25. However in the older male age groups MA is the most frequently detected. This pattern is not reflected in the female sample where MA consistently ranks as the most common drug detected in all age groups.

When prevalence rates are examined over time, drug driving detection rates have almost doubled from around 2.0% in the early years of roadside testing operations to just under 4.0% in the latter years. This increase could be due to a number of factors such as the 30.0% increase in the number of roadside tests which now cover more of the community compared to limited operations in the earlier years of the program. Also, over the years there has been an increase in intelligence driven targeting of sites. Finally, the increase may reflect an increase in drug driving behaviour across the community. However the data gathered for this project is unable to accurately identify any of the above propositions as the major cause.

One of the results in the data that requires further explanation is related to the number of tests carried out at different times of the day. The data provided in table 6 indicates that the majority of roadside tests were undertaken between the daytime hours of 6.00am to 5.59pm. At first inspection this may seem surprising when one considers the behaviour under investigation and the use of intelligence based targeting of testing times and sites would most likely suggest operations during the night (6:00pm-11:59pm) and early morning hours (midnight-5.59am). After discussions with operational police the artefact of over two thirds of tests being conducted during daytime hours (6:00am-5:59pm) is possibly a result of, deterrence based testing strategy (i.e. any time of the day), strategic operations with other crime initiatives and resource allocations favouring daylight hours. More significantly, as drug testing is carried out by a relatively small number of trained officers, it is likely the higher rate of detection during night-time and early morning hours (6:00pm-5:59am) takes these officers off the actual roadside screening activity to the more "one on one" time intensive activity of processing a positive screened driver. Furthermore there are a number of workplace operational and site safety constraints that need to be considered for night operations. These safety constraints restrict the number and size of operational sites at which RDT can be conducted where sites may be smaller and manned by fewer officers. Additionally, RDT and RBT operations are regularly undertaken as joint operations and during night operations these multi use sites are more often temporarily closed to incoming vehicles (compared to day operations) due to the site saturation of vehicles on the actual testing site (i.e. the site is full with no spaces for testing). Conversely, daytime testing activities are able to operate on larger sites with greater numbers of operational officers which facilitates a larger throughput of drivers. Consequently, while the number of tests during night and early morning hours is comparatively much less than daytime hours, the detection rate of positive drivers is almost twice that compared to daytime hours.

In conclusion, the data examined in this research clearly shows that even within the context of three illicit substances (THC, MA, MDMA) there are a significant number of drug driving apprehensions. While there are a number of debates about types and sensitivities of roadside oral fluid testing devices, current technologies can successfully be implemented on the roadside and can detect significant numbers of impaired drivers. The data also shows that as detection programs have grown over the years so to have the number of drivers apprehended. Some could suggest that drug impaired driving is increasing and at levels higher than drink driving, although more data would still need to be gathered and examined to substantially verify this claim. Unlike drink driving, which can be viewed as a single drug type driving offence, the multiple drugs involved in the current drug driving offences highlight the importance of regional, age and gender patters of consumption and driving. Interestingly, many types of transport including car, heavy vehicle, motorcycle and water craft all provided drivers with positive samples. This relatively new data on drug driving definitely indicates the need for enforcement, education and prevention and most importantly, the need for more research into the behaviour so as to appropriately inform responses and interventions.

Acknowledgments

The authors would like to thank Senior Sergeant Richard Teal, Ms Lisa O'Donnell and Ms Monique Grigg from the Queensland Police Service for their valuable contribution.

References

Albery IP, Strang J, Gossop M, Griffiths P (2000) Illicit drugs and driving: Prevalence, beliefs and accident involvement among a cohort of current out-of-treatment drug users. Drug and Alcohol Dependence 58: 197-204. DOI: http://dx.doi.org/10.1016/S0376-8716(99)00101-5

Athanaselis S, Dona A, Papadodima S, Papoutsis G, Maravelias C, et al. (1999) The use of alcohol and other psychoactive substances by victims of traffic accidents in Greece. Forensic Science International 102: 103-109.

Australian Bureau of Statistics (2012) 3218.0 - Regional Population Growth, Australia, 2010-11. Canberra: Australian Bureau of Statistics.

Australian Institute of Health and Welfare (2011) 2010 National Drug Strategy Household Survey report: Drug statistics series no. 25: Cat no. PHE 145. Canberra: Australian Institute of Health and Welfare. 323 p.

Buttress S, Tunbridge R, Oliver J, Torrance H, Wylie F. The incidence of drink and drug driving in the UK–A roadside survey in Glasgow; 2004.

Davey J, Freeman J (2009) Screening for drugs in oral fluid: drug driving and illicit drug use in a sample of Queensland motorists. Traffic Injury Prevention 10: 231-236. DOI: 10.1080/15389580902826817

Davey J, Leal N, Freeman J (2007) Screening for drugs in oral fluid: illicit drug use and drug driving in a sample of Queensland motorists. Drug and Alcohol Review 26: 301-307. DOI: 10.1080/09595230701247764

del Río MC, Gómez J, Sancho M, Alvarez FJ (2002) Alcohol, illicit drugs and medicinal drugs in fatally injured drivers in Spain between 1991and 2000. Forensic Science International 127: 63-70.

Dolan K, Rouen D, Kimber J (2004) An overview of the use of urine, hair, sweat and saliva to detect drug use. Drug and Alcohol Review 23: 213-217. DOI: 10.1080/09595230410001704208

Drummer OH, Gerostamoulos J, Batziris H, Chu M, Caplehorn J, et al. (2003) The incidence of drugs in drivers killed in Australian road traffic crashes. Forensic Science International 134: 154-162. DOI: http://dx.doi.org/10.1016/S0379-0738(03)00134-8

Drummer OH, Gerostamoulos J, Batziris H, Chu M, Caplehorn J, et al. (2004) The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. Accident Analysis & Prevention 36: 239-248. DOI: http://dx.doi.org/10.1016/S0001-4575(02)00153-7

Drummer OH, Gerostamoulos D, Chu M, Swann P, Boorman M, et al. (2007) Drugs in oral fluid in randomly selected drivers. Forensic Science International 170: 105-110. DOI: http://dx.doi.org/10.1016/j.forsciint.2007.03.028

Kuypers K, Legrand S-A, Ramaekers J, Verstraete A (2012) A case-control study estimating accident risk for alcohol, medicines and illegal drugs. PLoS ONE 7: e43496.

Longo MC, Hunter CE, Lokan RJ, White JM, White MA (2000) The prevalence of alcohol, cannabinoids, benzodiazepines and stimulants amongst injured drivers and their role in driver culpability: Part I: the prevalence of drug use in drivers, and characteristics of the drug-positive group. Accident Analysis & Prevention 32: 613-622. DOI: http://dx.doi.org/10.1016/S0001-4575(99)00110-4

Mura P, Chatelain C, Dumestre V, Gaulier J, Ghysel M, et al. (2006) Use of drugs of abuse in less than 30-year-old drivers killed in a road crash in France: a spectacular increase for cannabis, cocaine and amphetamines. Forensic Science International 160: 168-172. DOI: http://dx.doi.org/10.1016/j.forsciint.2005.09.006

Papafotiou Owens K, Boorman M (2011) Evaluating the deterrent effect of random breath testing (RBT) and random drug testing (RDT): the driver's perspective: research findings.
Rowden P, Mazurski E, Withaneachi D, Stevens M (2011) Roadside drug testing in New South Wales. Australasian Road Safety Research, Policing, and Education Conference. Perth, Australia.
Swann P, Boorman M, Papafotiou K. Impairment and driving assessments of drivers given amphetamines, cannabis and benzodiazepines and oral fluid testing results; 2004.
Thompson P (2008) Driver drug testing in South Australia. Australasian Road Safety Research Policing Education Conference. Adelaide, Australia.
Thompson P (2012) Changing trends of drug driving detections in South Australia. Australasian Road Safety Research, Policing, and Education Conference. Wellington, New Zealand.
Toennes SW, Steinmeyer S, Maurer H-J, Moeller MR, Kauert GF (2005) Screening for drugs of abuse in oral fluid—correlation of analysis results with serum in forensic cases. Journal of Analytical Toxicology 29: 22-27. DOI: 10.1093/jat/29.1.22
Walsh JM, Gier JJ, Christopherson AS, Verstraete AG (2004) Drugs and driving. Traffic Injury Prevention 5: 241-253. DOI: 10.1080/15389580490465292
Woolley JE, Baldock MRJ (2009) Review of Western Australian drug driving laws: Centre for Automotive Safety Research.
Wylie F, Torrance H, Seymour A, Buttress S, Oliver J (2005) Drugs in oral fluid: Part II. Investigation of drugs in drivers. Forensic Science International 150: 199-204. DOI: http://dx.doi.org/10.1016/j.forsciint.2005.02.025

Table 1: Month and year each Australian jurisdiction introduced roadside drug testing

Australian Jurisdiction	Month/Year
Victoria	December 2004
Tasmania	July 2005
South Australia	July 2006
New South Wales	December 2006
Western Australia	October 2007
Queensland	December 2007
Northern Territory	July 2008
Australian Capital Territory	May 2011

Table 2: Roadside drug tests conducted and offences detected by year, 1 December 2007 to 30 June 2012

Year of detection	Number of roadside tests conducted	Number of positive roadside tests	% of positives per year	Detection (%)	Detection rate for RDT	Comparative Queensland RBT detection rate
2007	700	18	0.8	2.3	1:39	1:115
2008	10,747	216	10.1	2.0	1:50	1:97
2009	12,489	254	11.9	2.0	1:49	1:95
2010	21,655	440	20.7	2.0	1:49	1:101
2011	25,172	825	38.8	3.3	1:31	1:123
2012	9,861	376	17.7	3.8	1:26	1:133
Total	80,624	2,129	100.0	2.7	1:38	1:107

Note: 2007 and 2012 are not complete calendar years.

Table 3: Roadside drug tests and offences detected by Queensland police region, 1 December 2007 to 30 June 2012

Police Region	No. of roadside tests conducted	% total tests	No. of positive roadside tests	% of positives	Queensland population as at 30 June 2012 [1]	% of Queensland population
Central	8,740	10.8	215	10.1	388,887	8.6
Far Northern	4,895	6.1	143	6.7	267,335	5.9
Metro North	9,836	12.2	225	10.6	677,433	15.0
Metro South	8,083	10.0	219	10.3	742,049	18.2
North Coast	20,144	25.0	467	21.9	824,315	18.2
Northern	4,514	5.6	123	5.8	276,645	6.1
South Eastern	13,151	16.3	475	22.3	837,854	18.5
Southern	11,261	14.0	262	12.3	510,011	11.3
Total	80,624	100.0	2,129	100.0	4,524,529	100.0

1 Source: Australian Bureau of Statistics, 2012; Queensland Police Service, Statistical Services

Table 4: Positive drug driving offences by vehicle type and percentage of vehicles on register

Vehicle Type	Number of detection	% total detections	% total vehicles on register in Queensland as at 30 June 2012
Car	1765	82.9	91.9
Heavy Vehicle (>4.5tonne)	265	12.4	4.0
Motorcycle	84	3.9	3.8
Watercraft	12	.7	NA
Bus	3	.1	0.3

Table 5: Number of roadside drug tests conducted by day of week

Day of week	Number of roadside tests conducted	Number of positive roadside tests	% of positives per day of week	Detection (%)
Monday	6,749	127	6.0	1.9
Tuesday	9,279	159	7.5	1.7
Wednesday	10,990	231	10.9	2.1
Thursday	13,177	336	15.8	2.6
Friday	12,756	368	17.2	2.9
Saturday	14,017	511	24.0	3.7
Sunday	13,656	397	18.6	2.9
Total	80,624	2,129	100.0	2.7

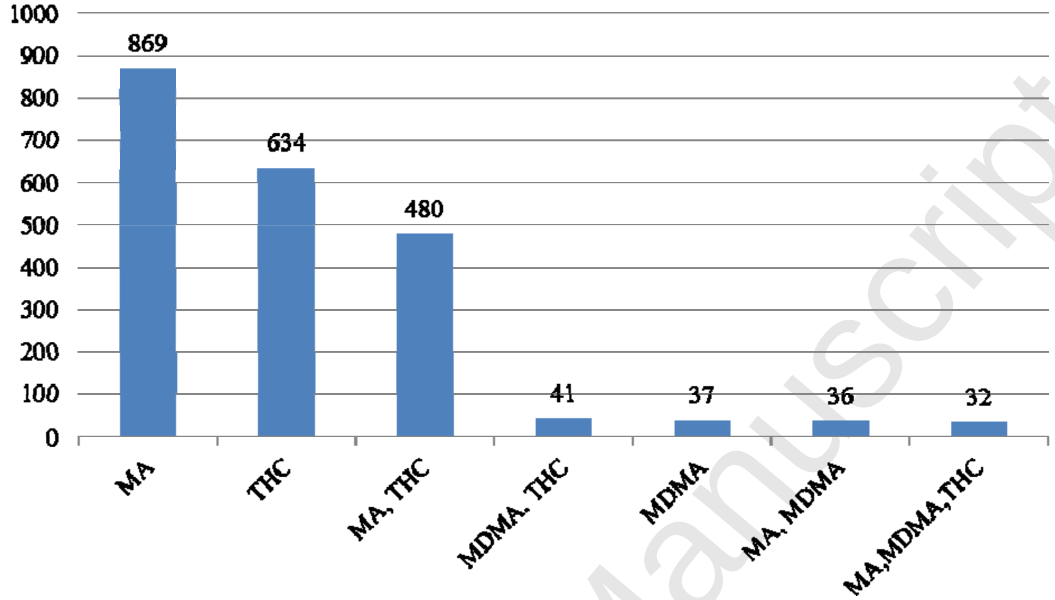

Figure 1: Frequency of positive tests by drug type

Table 6: Proportion of positive tests by drug type for the period 2007-2012 and the percentage of drug detected each year (in parenthesis).

	Year						
Drug Type	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	Total (%)
MA	12 (1.4) (66.7)	80 (9.2) (37.0)	55 (6.3) (21.7)	160 (18.4) (36.4)	372 (42.8) (45.1)	190 (21.9) (50.5)	869 (100) (40.8)
THC	1 (0.2) (5.6)	40 (6.3) (18.5)	129 (20.3) (50.8)	155 (24.4) (35.2)	227 (35.8) (27.5)	82 (12.9) (21.8)	634 (100) (29.8)
MA/THC	1 (0.2) (5.6)	57 (11.9) (26.4)	43 (9.0) (16.9)	101 (21.0) (23.0)	194 (40.4) (23.5)	84 (17.5) (22.3)	480 (100) (22.5)
MDMA/THC	0 (0.0) (0.0)	15 (36.6) (6.9)	5 (12.2) (2.0)	4 (9.8) (0.9)	11 (26.8) (1.3)	6 (14.6) (1.6)	41 (100) (1.9)
MDMA	2 (5.4) (11.1)	8 (21.6) (3.7)	9 (24.3) (3.5)	6 (16.2) (1.4)	11 (29.7) (1.3)	1 (2.7) (0.3)	37 (100) (1.7)
MA/MDMA	1 (2.8) (5.6)	7 (19.4) (3.2)	6 (16.7) (2.4)	8 (22.2) (1.8)	6 (16.7) (0.7)	8 (22.2) (2.1)	36 (100) (1.7)
MA/MDMA/THC	1 (3.1) (5.6)	9 (28.1) (4.2)	7 (21.9) (2.8)	6 (18.8) (1.4)	4 (12.5) (0.5)	5 (15.6) (1.3)	32 (100) (1.5)
Age Group Total	18 (0.8) (100)	216 (10.1) (100)	254 (11.9) (100)	440 (20.7) (100)	825 (38.8) (100)	376 (17.7) (100)	2,129 (100) (100)

Note: 2007 and 2012 are not complete calendar years.

Table 7: Proportion of positive tests by drug type across the Queensland police regions and percentage of drug type detected within each region (in parenthesis).

	QPS Region								
Drug Type	CR (%)	FNR (%)	MNR (%)	MSR (%)	NCR (%)	NR (%)	SER (%)	SR (%)	Total (%)
MA	114 (13.1) (53.0)	20 (2.3) (14.0)	108 (12.4) (48.0)	95 (10.9) (43.4)	169 (19.4) (36.2)	44 (5.1) (35.8)	200 (23.0) (42.1)	119 (13.7) (45.4)	869 (100) (40.8)
THC	49 (7.7) (22.8)	91 (14.4) (63.6)	33 (5.7) (14.7)	49 (7.7) (22.4)	163 (25.7) (34.9)	51 (8.0) (41.5)	124 (19.6) (26.1)	74 (11.7) (28.2)	634 (100) (29.8)
MA/THC	47 (9.8) (21.9)	22 (4.6) (15.4)	59 (12.3) (26.2)	49 (10.2) (22.4)	100 (21.4) (21.4)	22 (4.6) (17.9)	124 (25.8) (26.1)	57 (11.9) (21.8)	480 (100) (22.5)
MDMA/ THC	3 (7.3) (1.4)	6 (14.6) (4.2)	3 (7.3) (1.3)	6 (14.6) (2.7)	11 (26.8) (2.4)	3 (7.3) (2.4)	3 (7.3) (0.6)	6 (14.6) (2.3)	41 (100) (1.9)
MDMA	0 (0.0) (0.0)	3 (8.1) (2.1)	10 (27.0) (4.4)	6 (16.2) (2.7)	11 (29.7) (2.4)	2 (5.4) (1.6)	4 (10.8) (0.8)	1 (2.7) (0.4)	37 (100) (1.7)
MA/ MDMA	0 (0.0) (0.0)	0 (0.0) (0.0)	10 (27.8) (4.4)	7 (19.4) (3.2)	8 (22.2) (1.7)	0 (0.0) (0.0)	8 (22.2) (1.7)	3 (8.3) (1.1)	36 (100) (1.7)
MA/ MDMA/ THC	2 (6.3) (0.9)	1 (3.1) (0.7)	2 (6.3) (0.9)	7 (21.9) (3.2)	5 (15.6) (1.1)	1 (3.1) (0.8)	12 (37.5) (2.5)	2 (6.3) (0.8)	32 (100) (1.5)
QPS Region Total	215 (10.1) (100)	143 (6.7) (100)	225 (10.6) (100)	219 (10.3) (100)	467 (21.9) (100)	123 (5.8) (100)	475 (22.3) (100)	262 (12.3) (100)	2,129 (100) (100)

Note: CR = Central Region. FNR = Far Northern Region. MNR = Metro North Region. MSR = Metro South Region. NCR = North Coast Region. NR = Northern Region. SER = South Eastern Region. SR = Southern Region.

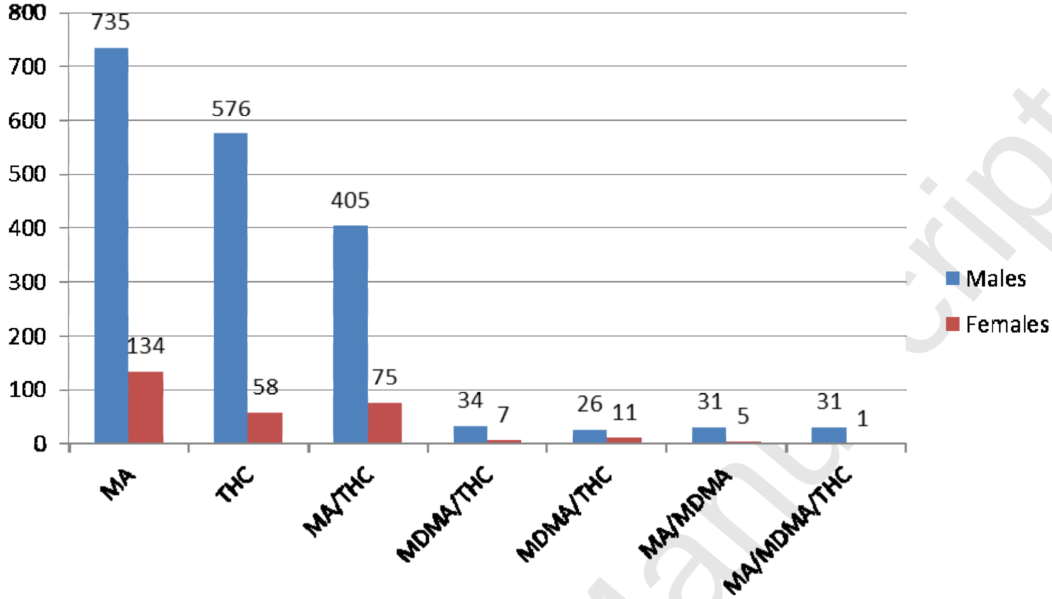

Figure 2: Frequency of positive tests by drug type and gender

Table 8: Proportion of positive tests by drug type and age group and the percentage of drug type detected within each age cohort (in parenthesis).

	Age Group							
Drug Detected	17-19 (%)	20-24 (%)	25-29 (%)	30-39 (%)	40-49 (%)	50-59 (%)	60+ (%)	Total (%)
MA	24 (2.8) (15.6)	98 (11.3) (32.3)	161 (18.5) (38.9)	321 (36.9) (46.6)	207 (23.8) (46.1)	52 (6.0) (48.1)	6 (0.7) (50.0)	869 (100) (40.8)
THC	69 (10.9) (44.8)	101 (15.9) (33.3)	122 (19.2) (29.5)	179 (28.2) (26.0)	124 (19.6) (27.6)	34 (5.4) (31.5)	5 (0.8) (41.7)	634 (100) (29.8)
MA/THC	36 (7.5) (23.4)	69 (14.4) (22.8)	86 (17.9) (20.8)	160 (33.3) (23.2)	109 (22.7) (24.3)	19 (4.0) (17.6)	1 (0.2) (8.3)	480 (100) (22.5)
MDMA/THC	9 (22.0) (5.8)	13 (31.7) (4.3)	10 (24.4) (2.4)	6 (14.6) (0.9)	0 (0.0) (0.0)	3 (7.3) (2.8)	0 (0.0) (0.0)	41 (100) (1.9)
MDMA	9 (24.3) (5.8)	9 (24.3) (3.0)	12 (32.4) (2.9)	7 (18.9) (1.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	37 (100) (1.7)
MA/MDMA	2 (5.6) (1.3)	6 (16.7) (2.0)	16 (44.4) (3.9)	7 (19.4) (1.0)	5 (13.9) (1.1)	0 (0.0) (0.0)	0 (0.0) (0.0)	36 (100) (1.7)
MA/MDMA/THC	5 (15.6) (3.2)	7 (21.9) (2.3)	7 (21.9) (1.7)	9 (28.1) (1.3)	4 (12.5) (0.9)	0 (0.0) (0.0)	0 (0.0) (0.0)	32 (100) (1.5)
Age Group Total	154 (7.2) (100)	303 (14.2) (100)	414 (19.4) (100)	689 (32.4) (100)	449 (21.1) (100)	108 (5.1) (100)	12 (0.6) (100)	2,129 (100) (100)