

**Drug Driving in New Zealand**  
**A survey of community attitudes,**  
**experience and understanding**

**New Zealand Drug Foundation**  
**August 2009**

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# **Drug Driving in New Zealand: A survey of community attitudes, experience and understanding**

## **Executive Summary**

### **Background**

New Zealand has a history of effective initiatives around many road safety concerns such as seat belt use, speeding, and drink driving. However, driving under the influence of drugs other than alcohol has gone largely unmonitored and unenforced. The introduction of new drug driving enforcement legislation for New Zealand inspired the Drug Foundation to investigate the drug driving issue in an effort to fill a gap in New Zealand drug driving research. The research was funded by the Ministry of Health's National Drug Policy Discretionary Grant Fund.

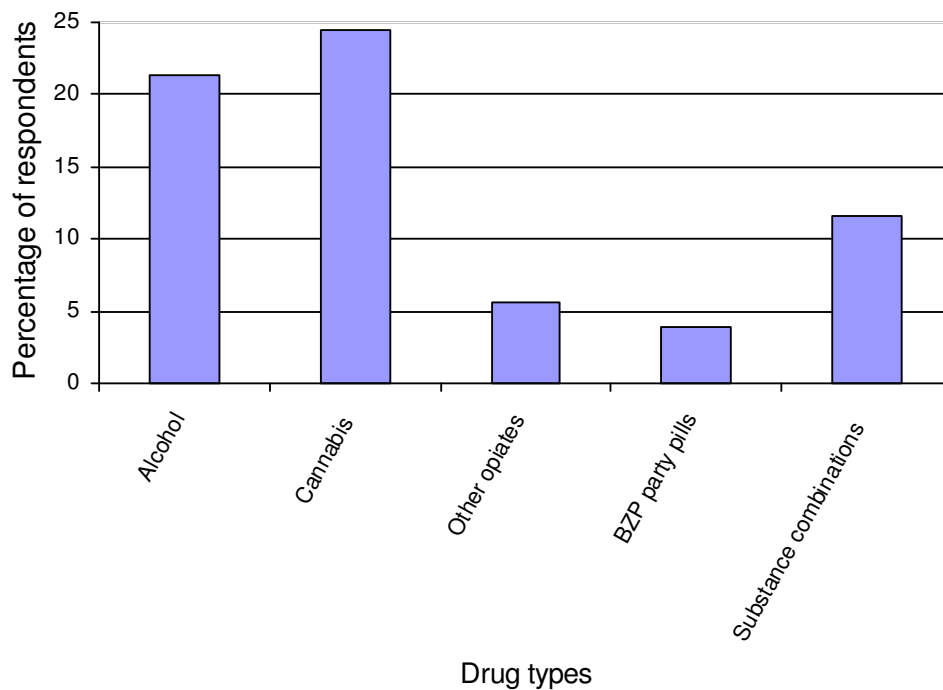
Little is known about the prevalence of drug driving in New Zealand, and even less is known about New Zealanders attitudes and knowledge around driving under the influence of drugs other than alcohol. Therefore the aims of the current research were to assess New Zealanders' knowledge, attitudes and behaviours around driving under the influence of psychoactive substances, including illicit drugs, prescription medicines, and alcohol, for both users and non-users, and drug drivers and non-drug drivers. For the purpose of this research, the term drug driving will refer to driving under the influence of any impairing substance, including alcohol, unless otherwise specified.

The research involved a review of literature around drugs and driving, in-depth interviews with 12 key experts from around New Zealand with knowledge and experience from drug and alcohol and/or road safety sectors, and an internet survey of 1164 New Zealanders. Each of these phases of the research focused on issues around prevalence of drug driving; driver impairment associated with drug use, attitudes and perceptions towards drug driving, and ways to reduce driving under the influence of drugs.

## Key findings

One of the aims of the research was to gain some indication of the prevalence of drug driving in New Zealand. Internet respondents who had used substances were asked whether they had driven within three hours of using drugs in previous 12 months, or for alcohol, whether they had driven while they felt they were over the legal limit allowed for driving. Figure ES1 shows the percentage of respondents who reported driving under the influence in the previous 12 months for the 5 most commonly driven on substances. Driving under the influence of cannabis was the most common drug driving behaviour (24.5%) for internet respondents. However, people who use drugs were over represented in the sample compared to estimates of rates of drug use in New Zealand's general population, suggesting these finding might be an over estimate of drug driving in the driver population. **Therefore, rates of driving under the influence from the internet survey should not be interpreted as reflecting the prevalence of drug driving in the general population of New Zealand drivers.**

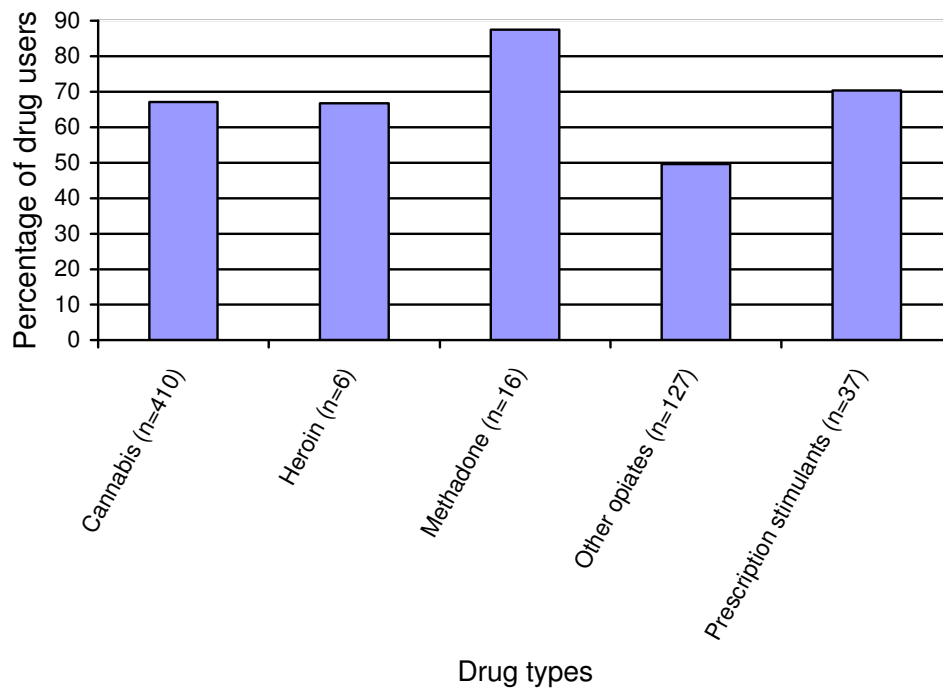
Figure ES1: Drug driving behaviour reported by internet respondents for five most commonly driven on substances (n=1124).



\*Global margin of error at 95% confidence interval is 2.9%

It was of further interest to examine rates of drug driving within drug user groups. Figure ES2 shows what percentage of people who use drugs had driven under the influence of drugs in the previous 12 months for the five most commonly driven on substances. Methadone was the most commonly driven on substance (87.5%). However small numbers of users for heroin and methadone mean these findings should be interpreted with caution. There are also issues around tolerance of impairing effects for opiate drugs like heroin, methadone and other opiates, as well as prescription stimulants. High rates of driving after use of these drugs might reflect levels of tolerance for some users of these drugs, and impairment cannot be assumed.

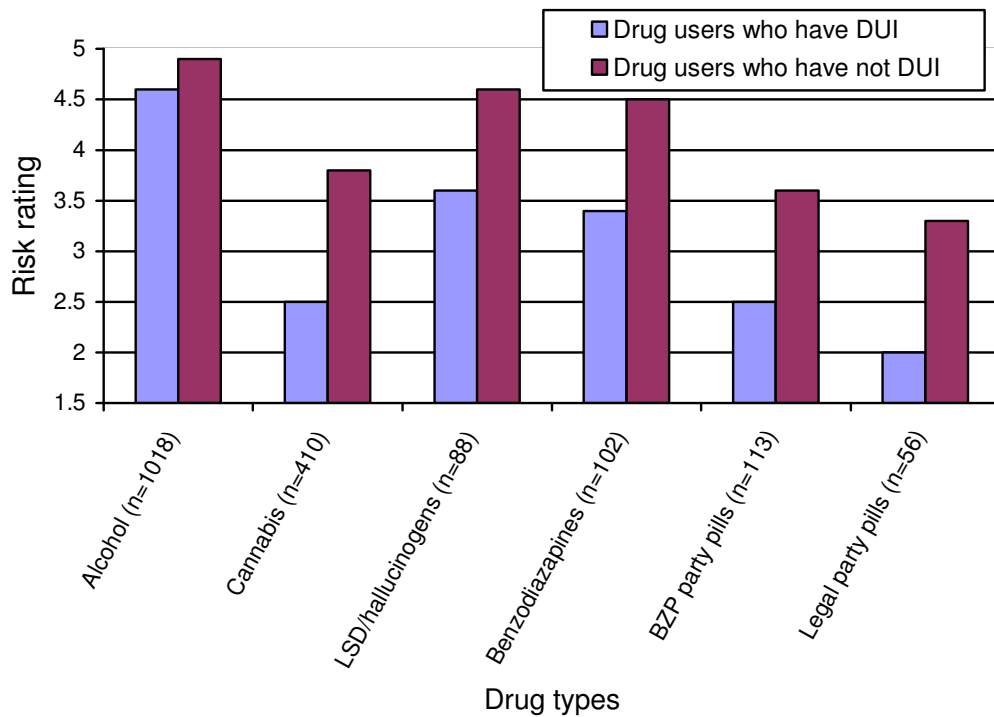
Figure ES2: Percentage of users of each substance who reported drug driving in the previous 12 months for the five most commonly driven on substances.





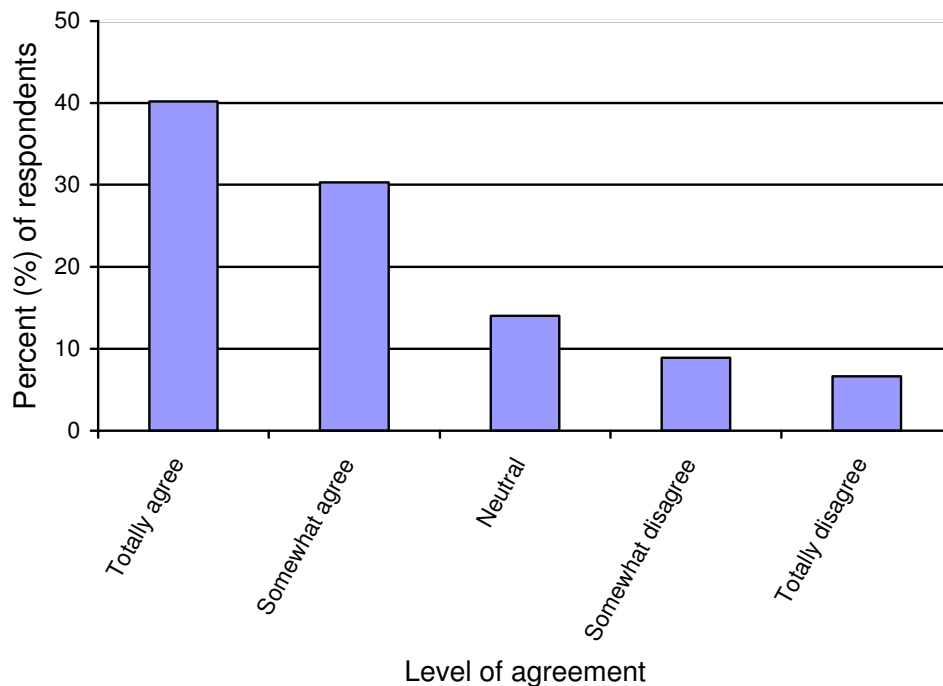
Previous research has suggested that people who use drugs perceive less risk around driving under the influence of drugs than drivers who do not use drugs. As drug driving was the risky behaviour being examined, not drug use, the current study asked people who use drugs how they rated the risks of driving under the influence of drugs. They were asked to rate drug driving risk on a five-point scale from 'safe' (one) to 'dangerous' (five). Figure ES3 shows the differences in risk ratings for people who use drugs who have and have not driven under the influence in the previous 12 months. This graph only depicts ratings for substances for which the difference between the two groups was significant to .001. Despite both groups having experienced the impairing effects of the drugs, drug drivers perceive less risk for driving under the influence than drug users who have not driven under the influence for the previous 12 months.

Figure ES3: Mean risk ratings for drug users who have and have not driven under the influence in the previous 12 months where the difference between groups is significant to .001.



As the new drug driving legislation focused heavily on enforcement by way of roadside testing, it was of interest to ask respondents what they thought about roadside testing for drug impairment. Internet respondents were asked their level of agreement with the statement that “Random roadside drug testing would improve road safety in New Zealand”. Figure ES4 presents the proportions of respondents who agreed and disagreed with the idea of roadside testing for drug impairment. The majority of respondents ‘totally agreed’ (40.2%) or ‘somewhat agreed’ (30.3%) that roadside drug testing would improved road safety.

Figure ES4: Level of agreement with the statement that “Random roadside drug testing would improve road safety in New Zealand”



\*Global margin of error at 95% confidence interval is 2.9%

## Summary of findings, implications and conclusions

### Prevalence

1. The substance most commonly driven under the influence of is cannabis with 24.5 percent of respondents reporting driving under the influence in the previous 12 months (margin of error 2.9%). This should not be interpreted as reflecting the prevalence of drug driving in the general population of New Zealand drivers. Cannabis use is also prevalent in the general population indicating that cannabis driving should be a priority area for both enforcement and public education, as well as treatment initiatives.

2. Driving under the influence of alcohol and other drug combinations was also relatively common and is high risk behaviour due to increased impairment. This should also be a priority area for enforcement and public education initiatives.
3. Drug driving was relatively prevalent among people who use drugs in the sample, indicating drug driving is likely to be a road safety issue in New Zealand. Prevention initiatives to reduce drug driving appear to be justified and necessary.
4. Drug drivers tended to be characteristically different from people who use drugs that did not drive under the influence, especially in terms of how they perceived the risks of driving under the influence.
5. More research is required to gain an accurate assessment of drug driving prevalence in New Zealand. General driver population data from random roadside testing, crash injury data and fatality data from New Zealand research will provide a more complete picture of drug driving prevalence in New Zealand.

### **Impairment**

1. International research has demonstrated that drugs cause driving impairment and that driving while under the influence of drugs is a threat to road safety.
2. Drug drivers' perceptions the last time they drove under the influence were generally of minimal impairment, but varied depending on the substance used.
3. Awareness of drug driving impairment for those engaged in the behaviour is low. This presents a challenge for drug driving education campaigns, as messages that are not consistent with the target audience's experiences have the potential to be dismissed by them as incorrect.
4. Further research into the experiences of drug drivers and the reasons for their perceptions of impairment could provide valuable information for use in the development of education campaigns that could be more likely to be accepted by the target audience.

### **Risk perception, knowledge and understanding of drug driving**

1. Attitudes toward drug driving appear to predict drug driving behaviour. Understanding the differences in perceptions of risk for people who use drugs who do and do not drive under the influence could be key to the development of messages for prevention campaigns. Further research should investigate why some people who use drugs choose to drive under the influence while others do not.
2. All drugs were perceived to be dangerous when driving under the influence, though some were perceived to be safer than others.
3. There was a general lack of knowledge around the effects of drugs on driving.
4. Driving under the influence of cannabis is again highlighted as a potential priority for prevention initiatives. While the literature shows that cannabis is an impairing substance, internet respondents perceived it to be the least dangerous drug for

driving under the influence. They also reported being knowledgeable about cannabis relative to other drugs. This indicates a level of misinformation around cannabis and driving which should be targeted as a priority in any future countermeasures.

### **Countermeasures**

1. According to the research literature the most effective drug driving prevention initiatives include both enforcement and public education aspects. Drug driving prevention initiatives should focus on increasing both the perceived and actual risks of apprehension for drug drivers. There may be a sub-group of drug drivers who would decide not to drive under the influence if they felt the risks of apprehension were higher.
2. There is a dearth of evidence around the efficacy of the standard field sobriety test (SFST) or Compulsory Impairment Test (CIT) in relation to drug impairment. Further research on the SFST or CIT for drugs other than alcohol is essential. In New Zealand, however, the requirement for an officer to first have good cause to suspect the driver has consumed a drug or drugs before s/he can require the driver to undergo a CIT and follow-up blood test, will ensure no one is charged with drug driving on the basis of an impairment test alone. Assessment of the proposed new enforcement programme should evaluate its ongoing effectiveness in detecting drug drivers.
3. Road side testing is perceived by respondents to be an effective method of improving road safety.
4. Internet respondents' had a preference for impersonal sources of drug driving information, likely due to the illegal nature of many drugs. Public education campaigns should focus on these impersonal media so that drivers can access drug driving information anonymously.
5. If internet respondents' support for roadside testing is reflected in the general community then the introduction of roadside testing for drug impairment should be acceptable to the public of New Zealand. Ongoing support for the testing programme will depend on the efficacy of the testing process.

## **1. Introduction**

### **1.1 Drug driving – the New Zealand context**

There is a dearth of research evidence around driving under the influence of drugs in New Zealand. However international evidence suggests that driving under the influence of drugs other than alcohol poses significant risks to road safety (Barbone, McMahon, Davey, Morris, Reid, McDevitt & MacDonald, 1998; Kelly, Darke & Ross, 2004; Longo, Hunter, Lokan, White & White, 2000b; Movig et al., 2004; Neutel, 1998; Ogden & Moskowitz, 2004; Papafotiou, Carter & Stough, 2005a; Ramaekers, Robbe & O’Hanlon, 2000; Ramaekers, Berghaus, van Laar & Drummer, 2004; Ronen et al., 2008). The New Zealand government is in the process of introducing new drug driving enforcement legislation that will strengthen police powers to test drivers suspected of driving under the influence of drugs. It is important then that we begin to understand the extent and nature of the drug driving problem in New Zealand. The aim of this research is to provide a better understanding of drug driving as a road safety issue by exploring the drug driving behaviours, attitudes, and knowledge of New Zealand drivers. This new information will inform the development of policy and education campaigns to reduce drug driving.

## **2. Methodology**

### **2.1 Aims**

1. To assess New Zealanders’ knowledge, attitudes and behaviours around driving under the influence of psychoactive substances, including illicit drugs, prescription medicines, and alcohol, for both users and non-users, and drug drivers and non-drug drivers.
2. To inform the development of prevention initiatives and resources for New Zealand communities in relation to drugs and driving.

The methodology for this study is a replication of an Australian drug driving project conducted by the Australian Drug Foundation (Mallick, Johnston, Goren, & Kennedy, 2007). The research consisted of three phases: a comprehensive literature review, key expert interviews, and an internet survey.

Ethical approval for this research was obtained from the New Zealand Ministry of Health’s Health and Disability Ethics Committees.

### **2.2 Literature review**

A literature review was conducted to provide an evidence based background to the issue of drug driving and impairment. The literature review was intended to provide an overview of current understandings around drugs and driving, and was not intended to be an exhaustive review of all available research literature. Opinions, attitudes, and behaviours described by key experts and internet survey participants could be compared and contrasted against the research evidence. A literature search was conducted using electronic databases, and by searching reference sections of relevant research articles. The

electronic databases searched for this study were: National Drug Sector Information Service (previously ADCA), Psycinfo, ScienceDirect, Expanded Academic ASAP, Academic OneFile, ProQuest 5000, Wiley Interscience, and Google.

### **2.3 Key expert interviews**

Key experts were recruited from drug and alcohol, and road safety organisations with the aim of understanding stakeholder perspectives around drug driving prevalence, impairment, attitudes, perceptions and potential road-safety countermeasures. The semi-structured interview schedule was adapted from Mallick et al.'s (2007) Australian study to reflect the New Zealand drug driving context and stimulate responses relevant to New Zealand specific issues.

Eleven key expert interviews were conducted with 12 key experts from around New Zealand (one interview was conducted with two key experts from the same organisation). Key experts from a variety of sectors relating to drugs and/or driving were interviewed, including road safety organisations (n=2), information and education organisations (n=3), a driving industry representative (n=1), a consumer representative (n=1), a drug treatment professional (n=1), a medical professional (n=1), enforcement (n=2), and drug harm reduction organisations (n=1). See table 2.1.

Interviews took approximately 30 minutes and most were conducted over the phone, though one was conducted face-to-face. All interviews were recorded and transcribed. Transcribed interviews were read and themes relevant to the research aims were identified and recorded. Transcripts were re-read and interview excerpts were coded then selected as examples to illustrate common themes and ideas expressed by the key experts.

Table 2.1: Key expert industries and organisation types

Key expert number	Sector/organisation type
KE1	Information/education organisation
KE2	Road safety organisation
KE3	Education organisation
KE4	Driving industry
KE5	Policy/education organisation
KE6	Consumer representative
KE7	Drug treatment
KE8	Road safety
KE9	Medical professional
KE10	Enforcement
KE11	Harm reduction organisation

## 2.4 Internet survey

### Survey design

The internet survey was almost a direct replication of the internet survey conducted in Australia by Mallick et al. (2007) with amendments to reflect the New Zealand context. The survey collected basic demographic information including gender, age, ethnicity, geographical region of residence, and information about education and employment status. None of this information was used to identify participants as the survey was anonymous. Respondents aged 14 and under were screened out of the final analysis based on the age of eligibility for a learner driver's license at 15 years. Respondents were asked what their driver's license status was, and whether they had driven a vehicle (car, motorcycle, bus, or truck) in the past 12 months. Those who had driven in the past 12 months were considered 'drivers', and those who had not were considered 'non-drivers' for the purpose of this study.

Respondents were asked about their perceived risks of driving under the influence of a range of psychoactive substances including alcohol, illicit drugs, and prescription drugs. They were also asked questions relating to their knowledge of drug driving including how much they knew about the effects of drugs on driving, how long a driver should wait after drug use before driving, and where they sourced information about drug driving from in the past, and where they'd prefer to get it in the future.

Respondents were also asked if they had used a substance, and if so, how frequently they had used a range of substances in the past. Respondents who had driven in the previous 12 months were then asked a series of questions about their driving behaviour in relation to those substances they reported using. These included past and intended future drug driving. For all drugs except alcohol, respondents were asked whether they had driven within three hours of drug use in the previous 12 months, and how likely it was that they would do it again in the next 12 months. The three hour timeframe was selected for reasons outlined in Mallick et al. (2007), and as a replication of that study the timeframe was retained for the current research. Mallick et al. (2007) explain that three hours is an appropriate length of time to capture the majority of impairing effects of most drugs. For the alcohol questions respondents were asked if they had “driven while “under the influence” of alcohol (i.e. you felt that you were over the legal limit allowed to drive) in the last 12 months?” or how likely did they think it was that they would do so again in the next 12 months. The legal blood alcohol limit in New Zealand is 0.08percent.

Finally, drivers were asked a series of questions about their experience and attitudes towards roadside testing for alcohol and drugs.

### **Survey administration**

When potential respondents visited the advertised website they were presented with an information page outlining the purpose and design of the research, as well as explaining their ethical rights to anonymity and withdrawal from the study. Clicking the continue button at the bottom of the information page was taken as consent for participation. After completing the survey a page was displayed that thanked participants for their time and provided contact details for the help services Youthline and the Alcohol and Drug helpline.

The internet survey was hosted on SurveyMonkey, a secure online survey company. The survey was administered by the New Zealand Drug Foundation. The collated data was downloaded directly from a password-protected SurveyMonkey account and stored on a secure research computer.

### **Recruitment**

Respondents were recruited to the online survey via an advertising and awareness campaign that aimed to stimulate interest and participation in the study.

A viral email containing information about the survey and a link to the website was sent out by the New Zealand Drug Foundation when the survey was launched. The email targeted friends, family, and colleagues within New Zealand, who were encouraged to forward the email on to others. The email was also sent to the secretaries of car clubs in New Zealand, many of whom requested further information and printed information about the study in their regular newsletters.

A media release was issued to New Zealand media nationally gaining coverage in television, radio and print media. The media release “New survey to probe NZ drug driving” was issued nationally by the New Zealand Drug Foundation, 20 November, 2008.



The study was also advertised in a national gig guide magazine called the Groove Guide in the two week lead up to Christmas and New Year. This free weekly publication is circulated nationwide and advertises concerts, dance parties, and events across the country.

### **Limitations of the internet survey**

Online surveys are susceptible to sampling bias as they rely on respondents having access to the internet and being computer literate. It was also not possible to prevent respondents from answering the survey more than once. However, at the point of screening respondents who appeared to have identical responses to all demographic information were deleted from the sample. The sample is highly self-selected, however this is an issue for any voluntary survey study. Providing respondents with reimbursement for participation might encourage a wider variety of respondents, however in studies with samples of this size, the cost is prohibitive. The survey also relied on self-reported information and there is no way to ensure the truthfulness of responses. This is an issue for all survey research of this nature, however it is believed that the anonymous conditions for participation allowed respondents to be as honest as possible.

### **2.5. Structure of this report**

The results of the research are presented in the following chapters:

- Demographics (chapter 3)
- Prevalence (chapter 4)
- Impairment (chapter 5)
- Risk perception, knowledge and understanding of drug driving (chapter 6)
- Countermeasures (chapter 7)

Each chapter begins with a review of the research literature, followed by presentation of key expert interviews and results from the internet survey. Each chapter concludes with a discussion of the key findings from that section. Chapter seven summarizes the main findings and their implications from across the entire study.

## **3. Demographics**

### **3.1 Internet survey respondent demographics**

A total of 1450 respondents answered the internet survey. After screening out participants who did not complete the survey, those under 15 years of age, and those who entered inconsistent responses, the remaining sample was 1166. Of the 1166 respondents 1124 had driven a vehicle in the previous 12 months. Questions in the survey pertaining specifically to driving behaviour were asked only of the 1124 drivers in the sample. As non-drivers are also road-users as passengers or pedestrians, other questions where knowledge and attitudes were relevant were addressed to the entire sample of 1166.

Females were somewhat over-represented in the sample at 56.2 percent of internet respondents, 43.8 percent were male. The mean age of respondents was 38.1 years (SD 13.6, range 15 – 86). The geographical spread of internet respondents is presented in table 3.1. Compared to the New Zealand general population respondents from Auckland and Wellington were over represented with other areas generally under represented. This geographical spread of respondents means there is an over representation of urban and suburban New Zealanders, and an under representation of rural New Zealanders.

Table 3.1: Area of residence

Region	Number of respondents	Percentage of respondents (n=1166)	Percentage of general New Zealand population*
Auckland	450	38.6	32.4
Bay of Plenty	46	3.9	6.4
Canterbury	110	9.4	13.0
Gisborne	2	0.2	1.1
Hawke's Bay	20	1.7	3.7
Manawatu-Wanganui	53	4.5	5.5
Marlborough	7	0.6	1.1
Nelson & Bays including Tasman	23	2.0	2.2
Northland	40	3.4	3.7
Otago	42	3.6	4.8
Southland	21	1.8	2.3
Taranaki	23	2.0	2.6
Waikato	53	4.5	9.5
Wellington including Wairarapa	269	23.1	11.1
West Coast	7	0.6	0.8
Total	1166	99.9	100.2

\* Figures are from *New Zealand's 2006 Census of Population and Dwellings*

Table 3.2 presents the ethnic backgrounds of internet respondents. Compared to the New Zealand general population Pakeha/New Zealand Europeans are over-represented, and Māori, Pacific Nations, and Asian respondents are under-represented.

Table 3.2: Ethnicity

	Number of respondents	Percentage of respondents (n=1166)	Percentage of general New Zealand population*
Pakeha/NZ European	964	82.7	67.6
Māori	77	6.6	14.6
Pacific Nations	23	2.0	6.5
Asian	17	1.5	9.2
Other	85	7.3	10.7**
Total	1166	100.1	108.6***

\* Figures are from *New Zealand's 2006 Census of Population and Dwellings*

\*\* Figure includes ethnic group 'New Zealander' introduced in 2006

\*\*\* More than one ethnic group could be selected so percentages do not sum to 100

Internet respondents were asked what their highest year of school education was. Table 3.3 presents the highest school year completed by respondents. Though the New Zealand 2006 census did collect data on highest school qualification, Statistics New Zealand do not provide highest qualification data for secondary school separately from tertiary qualifications. General population high school data is therefore not available.

Table 3.3: Highest level of school education completed

	Number of respondents	Percentage of respondents (n=1166)
Did not go to school	1	0.1
Did not complete primary school	0	0
Did not complete intermediate	4	0.3
Year 9 (third form)	15	1.3
Year 10 (fourth form)	41	3.5
Year 11 (fifth form)	184	15.8
Year 12 (sixth form)	275	23.6
Year 13 (seventh form)	646	55.4
Total	1166	100

Internet respondents were also asked what the highest qualification they had obtained was. Compared to the New Zealand general population the sample was over-qualified with the majority of respondents having at least a university degree.

Table 3.4: Highest qualifications obtained

	Number of respondents	Percentage of respondents (n=1166)	Percentage of general New Zealand population*
Trade certificate	105	9.0	12.6
Non-trade certificate**	63	5.4	-
Diploma	170	14.6	5.0
Bachelors degree	269	23.1	10.0
Postgraduate degree or diploma	239	20.5	3.6
PhD or doctorate	25	2.1	0.5
Total	871	74.7	31.7***

\* Figures are from *New Zealand's 2006 Census of Population and Dwellings*

\*\* Not a response option in the Census

\*\*\* Total does not sum to 100 as the Census combined data for both Secondary school and post-school qualifications.

The employment status of respondents is presented in table 3.5. Internet respondents were more likely to be employed than the general New Zealand population, and were less likely to be unemployed.

Table 3.5: Employment status

	Number of respondents	Percentage of respondents (n=1166)	Percentage of general New Zealand population*
Self-employed**	121	10.4	62.8
Employed (full-time, part-time, or casual) for wages, salary or payment in kind**	839	72.0	
Unemployed	23	2.0	3.4
Working in the home***	36	3.1	
Student***	72	6.2	
Retired or on a pension***	41	3.5	
Unable to work***	20	1.7	
Other***	14	1.2	
Total	1166	100.1	

\* Figures are from *New Zealand's 2006 Census of Population and Dwellings*

\*\* Census data did not differentiate between employed and self-employed

\*\*\* Not measured in the Census

Employed respondents were asked which industry they worked in. Table 3.6 presents this industry information. Nearly a quarter of respondents (23.3%) reported working in the health industry, with the next most common industry being government and defence (12.3%).

Table 3.6: Employment industry

	Number of respondents	Percentage of respondents (n=960)
Manufacturing	26	2.7
Transport	24	2.5
Hospitality & tourism	31	3.2
Advertising, media, & entertainment	65	6.8
Health	224	23.3
Education	76	7.9
Government & defence	118	12.3
Management	9	0.9
Trades & services	49	5.1
Retail	27	2.8
Agriculture	13	1.4
Banking, finance, or insurance	22	2.3
Communications	24	2.5
Sales & marketing	25	2.6
Property	6	0.6
IT	55	5.7
Legal	9	0.9
Community & sport	31	3.2
Engineering	20	2.1
HR & recruitment	9	0.9
Science & technology	28	2.9
Other	69	7.2

### **3.2 Drug use of internet respondents**

Internet respondents were asked if they had used any of the listed substances in the previous 12 months. Table 3.7 presents the proportions of respondents reporting use of each substance included in the survey. Compared to the New Zealand general population, people who use drugs are over represented in the sample. This is perhaps unsurprising due to the self-selected nature of the sample. A survey relating to drug use may attract the attention of people who use drugs more than non-drug users. This over-representation of people who use drugs can be an advantage for surveys such as this, as it allows more reliable analysis of drug users' attitudes and behaviour.



Table 3.7: Reported substance use for sample drivers in previous 12 months

	Number of respondents	Percentage of respondent drivers (n=1124)*	Percentage of general population**
Alcohol	1018	90.6	85.1
Cannabis	410	36.4	17.9
Amphetamines/ methamphetamines	87	7.7	4.2
LSD/ hallucinogens	88	7.8	3.4
Ecstasy	138	12.3	3.9
Cocaine	38	3.4	1.1
Ketamine***	20	1.8	-
GHB type substances***	10	0.8	-
Heroin***	6	0.6	-
Methadone***	16	1.4	-
Other opiates (morphine, codeine, homebake)***	126	11.2	-
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine)***	37	3.3	-
Benzodiazepines (Valium, Serapax, Temazepam)***	102	9.1	-
BZP party pills	111	9.9	16.1
BZP free party pills***	55	4.9	-
Substance combination***	363	32.2	-

\*Global margin of error at 95% confidence interval is 2.9%

\*\* Figures from Wilkins and Sweetsur (2008), 2006 National Household Survey of Drug Use

\*\*\* Not reported in Wilkins and Sweetsur (2008)

Internet respondents were predominantly well educated, employed, Pakeha females from Auckland and Wellington. It is possible that this is partly an artifact of the internet based

format for the survey. The sample was self-selecting, and those in employment could be more likely to have access to the internet. Despite the relatively middle class demographic of respondents, drug use in the sample was high compared to the general population. This relative over-representation of people who use drugs allows for robust analysis of responses to questions relating to their drug driving behaviours and attitudes of people who use drugs. This is important as these are the respondents whose responses are most relevant to dealing with the issue of drug driving. However, as the level of drug use among survey respondents does not represent the level of drug use in the general population, there are limitations in using the data. In particular **the prevalence data should not be taken as an accurate representation of drug use on New Zealand roads.**

## **4. Prevalence of drug driving**

### **4.1 Literature**

There is very little research around the prevalence of drug driving in New Zealand, so assessments of our drug driving situation are based largely on international studies of prevalence, local data on rates of drug use in the general population, and limited drug driving research. The prevalence of drug driving has been measured internationally via several different research methods. Self-report survey data can provide an indication of drug driving behaviour in the general population, the driver population, or the drug using population. Roadside surveys of drivers stopped and blood tested at random provide data of actual drug driving prevalence in a distinct area and time, as well as the types and amounts of drugs commonly driven on. Hospital studies take blood samples from patients presenting with injuries as a result of vehicle crash to establish the prevalence of drugs in injured drivers. Fatal crash studies analyse blood specimens from drivers killed in car crashes. Higher incidence of drugs in samples from injured or killed drivers compared to the general driving population is taken to indicate a relationship between drug use and car crash. Some hospital and fatality studies will also assess the culpability of those drivers to verify the role of drug use in contributing to the car crash. The following review of drug driving prevalence research will examine findings from each of these study types with the aim of providing some insight into the prevalence of drug driving in New Zealand.

#### **Self-report and survey studies**

Few self-report studies attempt to survey the general driving population. Many measure the prevalence of drug driving in distinct populations. Armstrong et al. (2005) surveyed 331 Australian university students who drive. Eight point two percent reported drug driving in the previous 12 months, while 5.7 percent had drug driven in the 4 weeks prior to being surveyed. Cannabis was the substance driven on most commonly at 8.5 percent, followed by ecstasy (5.4%) and amphetamines (2.7%). Driving after co-ingestion of drugs and alcohol was relatively common, reported by 14.6 percent of drivers. Drug driving was less common than drink driving however, with 25.1 percent of students reporting drink driving in the previous 12 months.

In another Australian university study, Davey, Davey, and Obst (2005) surveyed 275 students about their drinking and drug driving behaviours. Thirteen percent of females and 20 percent of males had driven under the influence of drugs in the previous 12 months. Again, cannabis was the drug most commonly driven under the influence of

(13%), followed by amphetamines (6%) and ecstasy (3%). In this study students were more likely to have ever drug driven than drink driven (25% vs. 14%).

Mallick et al. (2007) conducted an online survey of Australian drivers. With a large sample from across Australia (n=6801), this study aimed to recruit a sample as representative of the general driving population as possible. Analgesics were the substance most commonly driven on (15%), followed by alcohol (12.6%), and cannabis (12.3%). The authors also reported that 9.1 percent of drivers in their sample reported driving after using a combination of two or more substances, with alcohol and cannabis the most common (4.1% of all driver respondents). However this study was subject to the same limitations as the current study, and over representations of certain demographics and people who use drugs prohibit generalisation of their data to the Australian driver population.

The prevalence of drug driving has also been examined for samples of Australian dance party or nightclub attendees. Duff and Rowland (2006) surveyed 455 club and rave festival patrons. Forty eight percent of this sample reported driving within four hours of illicit drug consumption in the previous 12 months, 22 percent reported that they were 'knowingly intoxicated' at the time. Degenhardt, Dillon, Duff and Ross (2006) interviewed 273 Australian nightclub attendees. When asked how they intended to travel home that night 10 percent said they would drive or be driven home by someone under the influence of alcohol, while similar proportions said they would drive or be driven home by someone under the influence of cannabis (11%) and/or methamphetamine (8%). Comparatively high rates of drug driving evidenced in these studies should be considered in the context of a population where drug use is prevalent, and often occurs in locations or at times where driving a vehicle is the most accessible mode of transport.

The prevalence of drug driving among drug user populations has been investigated. Cannabis is the substance most commonly driven under the influence of in drug user populations (Darke, Kelly & Ross, 2004; Davey, Davies, French, Williams & Lang, 2005; Lenne, Fry, Dietze & Rumbold, 2001; Ministry of Health, 2003). A national household survey of New Zealand drug users in 2003 reported that 39.5% of cannabis users, 27.1% of amphetamine users, and 15.8% of ecstasy users had driven while feeling under the influence of these drugs (Ministry of Health, 2007). Lenne et al. (2001) examined the drug driving behaviours of Australian cannabis users and reported that weekly – daily users (n=67) report driving 43 percent of the time they use cannabis. Another Australian study reported that driving a vehicle is the most common activity undertaken while under the influence of illicit substances, with 25 percent of users (n=211) reporting doing so (Davey et al., 2005). Darke, Kelly and Ross's (2004) study of drug driving among 300 Australian intravenous drug users (IDU) reported high rates of drug driving with 88 percent of IDU reporting driving under the influence of a substance in the previous 12 months, most commonly cannabis (57%) followed by heroin (56%), amphetamines (34%), and cocaine (33%). In the United Kingdom, Albery, Strang, Gossop and Griffiths (2000) reported that 81.7 percent of out-of-treatment drug users who had driven in the previous 12 months (n=71) had driven after consuming illicit substances. In this study driving under the influence (DUI) of heroin (63.8%) was marginally more common than DUI of cannabis (62.1%). The prevalence of self-reported DUI of substances among the drug using population in these international studies indicates that drug driving is likely to be an issue among New Zealand drug users.

## **Random roadside testing studies**

Random roadside testing studies require the cooperation of researchers and traffic enforcement to set up random testing stations, similar to random breath testing or 'booze buses'. The cost of setting up testing stations, gathering and analysing biological samples means few researchers undertake such resource intensive projects. Gjerde et al. (2008) conducted a roadside survey to establish the incidence of drink and drug driving in Norway. The road sites and times for collecting saliva samples were randomised to keep the sample as close to the general driving population as possible. Of the 12,000 drivers stopped, 88 percent (n=10,835) agreed to participate in the study and provide a saliva sample. Gjerde et al. (2008) reported that alcohol or drugs were detected in 4.5 percent of the sample. Medicinal drugs were present in 3.4 percent of drivers, while illicit drugs were present in 1.0 percent. Alcohol was present in only 0.4 percent of drivers.

In a New Zealand study (Vergara, 2006), blood samples collected as evidence for drink driving offences were also analysed for the presence of other drugs. Although this study did not sample the general driving population, the results provided an indication of the prevalence of driving under the influence of a combination of drugs and alcohol. Of the 2000 samples tested, 37 percent were positive for at least one other drug. In 95 percent of these drug positive samples only one other drug was detected. Cannabis was the most prevalent drug, found in 89.2 percent of cases positive for a single drug, while benzodiazepines were a distant second at 4.7 percent, followed by methamphetamine (1.1%) and morphine or heroin (0.1%). This study illustrates that cannabis is likely to be the drug of greatest concern to road safety in New Zealand, due to its relatively high prevalence, and the apparent tendency for co-ingestion of alcohol. However, it is important to keep in mind that this was not a general driver population sample, and drink drivers could be more or less likely than the general driver population to drug drive.

## **Hospital studies – injured drivers**

Hospital studies of drug driving incidence usually require the analysis of biological samples (most frequently blood) taken from injured drivers presenting to emergency departments after traffic crashes. Longo et al. (2000a) analysed blood samples from 2500 injured drivers presenting to emergency departments in South Australia. At least one substance was detected in 22.6 percent of injured drivers, including alcohol. Ten point three percent of injured drivers tested positive for a substance other than alcohol, most frequently active THC (2.8%). Only small numbers tested positive for drug combinations, the most frequently detected combination was alcohol and (either active or inactive) cannabinoids at 3 percent.

Active THC was not the most common substance detected in Ch'ng et al.'s (2007) study of drug incidence in injured drivers (n=436) presenting to a hospital in Victoria, Australia. Benzodiazepines were most common (15.6%), followed by opiates (11%), active THC (7.6%), and amphetamines (4.1%). Nine point four percent of injured drivers tested positive for more than one substance, most commonly a combination of cannabis and benzodiazepine.

Movig et al. (2004) compared the incidence of drugs in samples from injured drivers in hospital (cases, n=110) with samples provided by drivers stopped at random roadside survey sites (controls, n=816) in the Netherlands. Substances were more frequently

detected in the blood of hospital cases (40%) compared to survey controls (14%), indicating that drivers with drugs in their system are at increased risk of traffic accident. The authors reported that 8 percent of cases were positive for more than one substance.

### **Fatal crash studies**

Studies of substance use in fatally injured drivers provide evidence of the prevalence of drug use in serious car accidents. Many researchers interpret increased incidence of substance use among fatally injured drivers as indicating a causal relationship between drug use and car crash. However studies which also assess the culpability of drivers, confirming whether a driver was at fault or not, provide more insight into the involvement of substance use in crash risk.

Del Rio, Gomez, Sancho and Alvarez (2002) analysed blood samples from 5745 drivers killed in road accidents in Spain between 1991 and 2000. They reported that psychoactive substances were detected in half (50.1%) of fatally injured drivers. Alcohol accounted for the majority of substance positive drivers (43.8%), while illicit drugs were detected in 8.8 percent and medicinal drugs in 4.7 percent. Combined use of illicit substances was common, with multiple substances detected in 75.6 percent of illicit drug positive driver samples. The culpability of drivers in this study was not assessed.

Drummer et al. (2003) investigated the incidence of alcohol and drugs in 3398 driver fatalities across three states in Australia. Alcohol over 0.05mgs/ml was the most prevalent impairing substance (29.1%) while 23.5 percent of the sample was positive for an impairing substance other than alcohol. Cannabis was the most common drug (13.5%) though this included inactive THC metabolites, which are a non-impairing indication of cannabis use in the recent past. Opioids were present in 4.9 percent of the sample, and stimulants and benzodiazepines were both detected in 4.1 percent of the sample. The authors also reported that almost 10 percent of cases were positive for both alcohol and another drug. Drummer et al. (2004) followed up their 2003 prevalence study with a case-controlled culpability study using the same sample. This study and others investigating the relationship between drug use and car accident will be reviewed in chapter five.

### **Summary**

There is little to no research on the general population prevalence of drug driving in New Zealand. However, the international research reviewed can provide some insight into the likely prevalence of drug driving in New Zealand. Australian studies are useful, as the prevalence of drug use in the Australian general population, in the main, is similar to that of New Zealand (Australian Institute of Health and Welfare, 2005; Wilkins & Sweetsur, 2008). It is possible that similar proportions of New Zealander's who use drugs might drive while under the influence of drugs. Overall, the evidence suggests cannabis to be the illicit substance most commonly driven on while under the influence. Though our overall levels of drug use are similar, New Zealand has higher general population rates of cannabis use than Australia (Australian Institute of Health and Welfare, 2005; Wilkins & Sweetsur, 2008), it could be that driving under the influence of cannabis is a bigger issue in New Zealand than the Australian evidence suggests. Much of the vehicle crash research reviewed reported a level of combined substance use. Impairment research suggests that combinations of some substances have an additive effect, leading to more severe impairment than each substance alone (see chapter 5). Thirty seven percent of drink

drivers in Vergara's (2006) New Zealand study tested positive for at least one other substance, most frequently cannabis. This indicates that driving under the influence of a combination of substances is likely to be a road safety issue in New Zealand. It must be kept in mind however, that it is extremely difficult to attain accurate indications of actual on road drug driving prevalence. Different studies employ different methodologies and a diverse range of prevalence data is generated. No individual study alone should be taken as representative of the prevalence of drug driving in the general driver population. Rather, drug driving prevalence studies collectively indicate that some level of driving under the influence is likely in populations where there is drug use. For this reason more research into the prevalence of drug driving in New Zealand is essential, and as data is amassed from a variety of methodologies a clearer picture of drug driving prevalence in New Zealand will emerge.

## 4.2 Key expert interviews

When discussing the prevalence of drug driving in New Zealand, key experts tended to rely on anecdotal evidence or knowledge gained through experiences working in their field. A lack of New Zealand drug driving research meant that when key experts mentioned research evidence it was generally international. The prevalence of drug driving was often discussed in terms of the perceived importance or significance of the issue, rather than the actual rate of drug driving in New Zealand's driving population.

*Interviewer: Do you believe that there is a drug driving problem in New Zealand?*

*KE3: Yeah, I do it's, I mean obviously we still believe alcohol is the biggest problem and one of the reasons that I would say alcohol is a bigger problem than drugs is we deal with teenagers and so often money is a factor and it's much easier and cheaper for them to get a \$12 bottle of vodka, throw a sachet of raro in to it and that's them plastered for the night rather than spending however much money it is to go buy drugs. But drugs is certainly a factor.*

Expert three bases her assessment of the drug driving situation in New Zealand on her experiences working with teenagers. For this demographic she anecdotally describes alcohol as the biggest road safety issue, but acknowledges that drugs are also a "factor". Expert 10 relies on both international research and her own organisation's research to assess the prevalence of drug driving in New Zealand.

*KE10: All for the research that's been done in NZ and internationally we're not that different from what's happening overseas and that is clearly showing that drug driving is an issue. And since we implemented the field testing programme that we've been running for four years [...] And one of the questions the officers asked is have you taken any drugs, and they don't have to say and it's amazing you know out of the fifty on the page you know there's probably twenty or thirty who have said yes cannabis, methamphetamines, antidepressants and they've volunteered that information. So it's definitely happening out there.*

Expert 10 considers the international evidence and her organisation's own field testing programme and concludes that drug driving is "definitely happening". Experts were

typically sure that drug driving is happening in New Zealand, but did not attempt to estimate the actual prevalence.

Several experts raised the issue of drug driving among commercial drivers, especially truck drivers. Expert five relates international evidence of truck drivers using stimulant drugs to the New Zealand context.

KE5: *Another one is the professional drivers and it's been identified that there is an abundance of methamphetamine use amongst, this has been shown to increase crash risk amongst truck drivers internationally; if not amongst entire populations but definitely amongst truck drivers which may be a concern because the crashes that trucks are involved in are extremely expensive ones, so economically it's a concern as well as a concern to car drivers obviously.*

While expert five says that international rates of drug use in commercial drivers indicate we should be concerned about this issue in New Zealand, expert four points out the differences between truck driving overseas and New Zealand to support his opinion that drug driving is not a significant issue for New Zealand truck drivers.

KE4: *I guess I am taking a bit of a punt on this, I think that there probably is the recreational dope smoker who could possibly come to work a bit under the weather but I would be surprised if there is anything that compares say with the Australian model where you've got these long haul drivers who are pumping themselves full of amphetamines because of the distances and the times, so the difference here is that most of our line haul operators turn around at Turangi you know so you're not looking at very long periods compared to sort of the Australian or American models so I would be surprised if there is a real problem with amphetamine use or whatever to keep drivers awake.*

Overall, experts agreed that drug driving is a road safety issue in New Zealand; however none attempted to estimate the actual prevalence of the problem. This is likely due to the lack of research evidence and public awareness of drug driving, making it difficult to assess the extent of drug driving in New Zealand. Like key expert three, many also mentioned that drink driving continues to be a road safety concern for New Zealand.

### 4.3 Prevalence of drug driving reported by internet respondents

Respondents who reported driving in the previous 12 months (n=1124) and use of a substance in the previous 12 months were asked several questions regarding their use of that substance and driving. Forty one point seven percent of drivers reported driving under the influence of at least one of the survey substances in the previous 12 months. Twenty six point two percent of all drivers reported driving under the influence of an illicit substance in the previous 12 months; the majority of these (93.2%) had driven under the influence of cannabis. Nine point two percent of drivers in the sample reported driving within three hours of use of a prescription medicine (methadone, opiates, prescription stimulants or benzodiazepines). The margin of error for the prevalence of drug driving was 2.9%. This was calculated based on a driver population of 3,076,113 estimated from the number of people holding drivers licenses in New Zealand (Ministry of Transport, 2007).

The prevalence of drug driving for individual substances for all drivers, and for substance users is presented in table 4.1.

Table 4.1: Drug-driving behaviour reported by internet respondents

	Percentage of all drivers reporting drug driving in previous 12 months (n=1124)*	Percentage of users of each substance reporting drug driving** in previous 12 months (number of users)
Alcohol	21.4	23.6 (n=1018)
Cannabis	24.5	67.1 (n= 410)
Amphetamines/ methamphetamines	3.8	47.8 (n=90)
LSD/ hallucinogens	2.3	29.5 (n=88)
Ecstasy	3.3	26.8 (n=138)
Cocaine	1.2	34.2 (n=38)
Ketamine	0.5	30.0 (n=20)
GHB type substances	0.3	30.0 (n=10)
Heroin	0.4	66.7 (n=6)
Methadone	1.2	87.5 (n=16)
Other opiates (morphine, codeine, homebake)	5.6	49.6 (n=127)
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine)	2.3	70.3 (n=37)
Benzodiazepines (Valium, Serapax, Temazepam)	2.8	31.4 (n=102)
BZP party pills	3.9	38.9 (n=113)
BZP free party pills	2.0	41.1 (n=56)
Substance combination	11.6	35.7 (n=364)

\*Global margin of error at 95% confidence interval is 2.9%

\*\*Drug driving is defined as “feeling that you were over the legal limit allowed to drive” for alcohol, or within three hours after using any other substance.



When the prevalence of drug driving was examined for all drivers, cannabis was most common, with 24.5 percent of drivers reporting having driven within three hours of use in the previous 12 months. Cannabis driving was more prevalent than driving under the influence of alcohol (21.4%) for this sample. The third most common drug driving behaviour was driving under the influence of a combination of two or more substances (11.6%). A breakdown of which substance combinations are used is presented in table 4.2. The prevalence of driving under the influence of other substances for all drivers is relatively low compared to alcohol and cannabis, but reflects the lower prevalence of use of these substances in the general population (Wilkins & Sweetsur, 2008).

The prevalence of drug driving for people who use drugs in the sample provides an indication of the level of acceptance of driving under the influence within substance user groups. The substances for which the highest proportions of users reported driving while under the influence was methadone (87.5%) and prescription stimulants (70.3%). These results (and those for cocaine, ketamine, GHB, and heroin) must be interpreted with caution, as only a very small number of respondents reported using each of these substances in the previous 12 months making these results statistically unreliable and generalization would be inappropriate. Two thirds (67.1%) of cannabis users reported driving within three hours of cannabis use in the previous 12 months. Almost half (49.6%) of opiate users (other than heroin) reported driving within three hours of use in the previous 12 months. Fifty four point three percent of these were prescription opiate users, while the remainder of opiate users attained the drug without prescription or only sometimes had a prescription. Almost a third (31.4%) of benzodiazepine users reported having driven within three hours of using the drug. The majority (60.8%) of these were prescription users, while the rest used benzodiazepines without a prescription or only sometimes with a prescription. Significant proportions of meth/amphetamine, LSD/hallucinogen, ecstasy, and party pill users reported driving within three hours of using these substances, and over a third (35.7%) of polydrug users reported driving after using a combination of substances.

One hundred percent of polydrug drivers had combined alcohol and at least one other substance the last time they drove under the influence of a combination of substances. The largest combination of drugs was eight, though only one respondent reported this level of polydrug driving. Cannabis and alcohol was the most commonly reported drug driving combination (4.5% of all drivers). Table 4.2 presents a breakdown of drug combinations reported by polydrug drivers.

Table 4.2: Proportions of polydrug users

Polydrug driving combination	Percentage of all drivers (n=1124)	Percentage of polydrug drivers (n=99)
Alcohol and cannabis only	4.5	51.5
Alcohol and cannabis and at least one other substance	1.6	18.2
Alcohol and ecstasy with or without other substances	1.9	21.2
Alcohol and amphetamine/methamphetamine with or without other substances	1.2	13.1
Alcohol and benzodiazepines with or without other substances	0.5	6.1
Alcohol and opiates with or without other substances	0.6	7.1

#### 4.4 Characteristics of drug drivers

The gender, age, and frequency of drug use for driver respondents were examined.

##### *Gender*

Table 4.3 presents the proportions of males and females who have used each substance in previous 12 months who report driving under the influence.

Table 4.3: Proportions of males and females who have used each substance in previous 12 months who report driving under the influence.

	Gender	
	Male (%)	Female (%)
Alcohol	28.2 (n=443)	20.0 (n=575)
Cannabis	74.7 (n=233)	57.1 (n=177)
Amphetamines/ methamphetamines	47.1 (n=51)	48.7 (n=39)
LSD/ hallucinogens	33.9 (n=62)	19.2 (n=26)
Ecstasy	31.5 (n=73)	21.5 (n=65)
Cocaine	42.1 (n=19)	26.3 (n=19)
Ketamine	40.0 (n=15)	0.0 (n=5)
GHB type substances	28.6 (n=7)	33.3 (n=3)
Heroin	60.0 (n=5)	100.0 (n=1)
Methadone	87.5 (n=8)	87.5 (n=8)
Other opiates (morphine, codeine, homebake)	48.1 (n=52)	50.7 (n=75)
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine)	69.0 (n=29)	75.0 (n=8)
Benzodiazepines (Valium, Serapax, Temazepam)	40.4 (n=47)	23.6 (n=55)
BZP party pills	40.3 (n=62)	37.3 (n=51)
BZP free party pills	48.5 (n=33)	30.4 (n=23)
Substance combination	40.5 (n=200)	29.9 (n=164)

Males were significantly more likely to have driven under the influence of alcohol compared to females ( $\chi^2(1,1017)=9.38, p<.01$ ). Males were also significantly more likely

than females to have driven within three hours of cannabis use ( $\chi^2(1,409)=14.13$ ,  $p<.001$ ), and after using a combination of substances ( $\chi^2(1,363)=4.43$ ,  $p<.05$ ). There were no substances for which females were more likely to drive under the influence, so for all other substances male and female respondents were equally likely to have reported drug driving in the previous 12 months. Small numbers of users for some substances meant that statistical analysis did not produce significant results and gender differences may be evident in a larger sample of people who use drugs.

#### *Age*

The mean ages of respondents who have and have not driven under the influence of substances in the previous 12 months are presented in table 4.4. There were significant age differences for alcohol and methadone. Respondents who had driven under the influence of alcohol were significantly younger than those who had not ( $t(1016)=-5.8$ ,  $p<0.001$ ). While methadone users who had driven within three hours of use were significantly older than those who had not ( $t(14)=3.1$ ,  $p<0.01$ ). There were no other significant differences in age between drug drivers and non-drug drivers.

Table 4.4: Mean age of drug drivers versus non-drug drivers

	Mean age of previous 12 month drug drivers (number of respondents)	Mean age of users who have not driven under the influence in previous 12 months (number of respondents)
Alcohol*	33.5 (n=240)	39.1 (n=778)
Cannabis	32.5 (n=275)	32.2 (n=135)
Amphetamines/ methamphetamines	30.0 (n=43)	28.6 (n=47)
LSD/ hallucinogens	26.8 (n=26)	27.5 (n=62)
Ecstasy	29.1 (n=37)	29.0 (n=101)
Cocaine	30.5 (n=13)	30.4 (n=25)
Ketamine	25.8 (n=6)	28.3 (n=14)
GHB type substances	24.3 (n=3)	30.0 (n=7)
Heroin	34.3 (n=4)	31.0 (n=2)
Methadone**	42.7 (n=14)	24.0 (n=2)
Other opiates (morphine, codeine, homebake)	37.5 (n=63)	38.0 (n=64)
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine)	26.0 (n=26)	32.8 (n=11)
Benzodiazepines (Valium, Serapax, Temazepam)	34.5 (n=32)	36.9 (n=70)
BZP party pills	28.3 (n=44)	26.8 (n=69)
BZP free party pills	29.7 (n=23)	27.7 (n=33)
Substance combination	33.4 (n=130)	32.3 (n=234)

\*p<.001

\*\* p<.01

*Drug driving by frequency of use*

The relationship between frequency of substance use and drug driving behaviour was examined. Higher frequency of substance use was correlated with drug driving for many substances. Respondents who used a substance more often were more likely to have driven under the influence of that substance in the previous 12 months. This has also been demonstrated in previous research where driving under the influence was associated with more frequent use of the substances, or higher levels of dependence (Darke, Kelly & Ross, 2003; Lewis, Thombs & Olds, 2005, Mallick et al., 2007). Table 4.5 presents significant correlations between the frequency of substance use and drug driving.

Table 4.5: Significant correlations between higher frequency of substance use and drug driving in the previous 12 months.

	Pearsons correlation coefficient	Significance level
Alcohol	.18	<.001
Cannabis	.64	<.001
Amphetamines/ methamphetamines	.48	<.001
LSD/ hallucinogens	.24	<.05
Ecstasy	.37	<.001
Cocaine	.40	<.05
Ketamine	.70	<.01
Methadone	.64	<.01
Other opiates (morphine, codeine, homebake)	.34	<.001
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine)	.40	<.05
Benzodiazepines (Valium, Serapax, Temazepam)	.54	<.001
BZP party pills	.46	<.001
Substance combination	.33	<.001

The correlations between higher frequency of drug use and increased likelihood of drug driving indicate that respondents with drug dependence issues may be more likely to drive under the influence of drugs.

#### 4.5 Summary

International and local research evidence suggests that drug driving is likely to be a road safety issue in New Zealand. Australian drug driving research is extensive, and has employed multiple methods to evaluate the prevalence of drug driving. These Australian studies demonstrate that significant proportions of people who use drugs drive after substance use. Self-report studies report between 8.2 and 29.9 percent of samples driving under the influence of drugs, while similar rates of substance use were detected in car crash studies. Overall, cannabis was the most commonly detected illicit substance, though alcohol remained the most prevalent substance detected in fatally injured car crash drivers. It should be noted however that car crash data only provides an indication of drug driving prevalence for crash involved drivers, and rates of drug driving in the general driver population may differ from those of accident involved drivers.

Key experts were in agreement that drug driving is a road safety issue for New Zealand, though a lack of local research evidence meant that experts generally relied on anecdotal evidence or on the job experience to assess the prevalence of drug driving. Despite uncertainty over the actual prevalence of drug driving in New Zealand, experts discussed the issue as one of importance, and with confidence that drug driving is prevalent enough to warrant concern and action.

The internet survey of drivers was the first attempt to collect drug driving prevalence data from the general driver population in New Zealand. It should be noted that people who use drugs were over represented in the internet survey sample so prevalence rates should be interpreted with caution (see chapter 3). The prevalence data does provide a good indication of rates of drug driving within drug user populations. Rates of driving under the influence were high, with a quarter to two thirds of all people who use drugs in the sample reporting drug driving in the previous 12 months. Alcohol users were less inclined to drive under the influence than users of any other drug type. Existing enforcement and education around drink driving are likely to be impacting on levels of driving under the influence of alcohol. Small numbers of users for cocaine, ketamine, GHB, heroin, methadone, and prescription stimulants prevented reliable analysis of drug driving prevalence for these substances, though rates of drug driving were consistent with other drug types. Overall, internet survey responses provide evidence that considerable numbers of people who use illicit and prescription drugs have driven within three hours of substance use in the previous 12 months, and this could be indicative of a level of acceptance of drug driving within these drug using populations. It might also reflect the fact that there are as yet no national enforcement or education initiatives around reducing driving under the influence of substances other than alcohol.

Substantial numbers of respondents reported driving under the influence of more than one substance in the previous 12 months. All polydrug drivers combined alcohol with at least one other substance, most frequently cannabis. Polydrug driving is a concern as impairment research suggests cumulative or additive effects of some substances when combined, and this has been demonstrated for cannabis and benzodiazepines with alcohol (see chapter 5). Many polydrug drivers combined more than two substances, with 18.2

percent of polydrug users combining alcohol, cannabis, and at least one other substance. Polydrug driving should be of immediate concern to road safety policy makers. One in 10 drivers and one in three polydrug users in our sample reported polydrug driving, and these are potentially the most impaired drivers on New Zealand roads.

When the characteristics of drug drivers were examined, males were more likely than females to drive under the influence of alcohol, cannabis and two or more substances in the previous 12 months. There were no other gender differences. Respondents reporting driving under the influence of alcohol were significantly younger than drinkers who had not drunk driven in the previous 12 months, while methadone users who had driven within three hours of use were significantly older than methadone users who had not driven under the influence in the previous 12 months. There were no other significant differences in age of drug drivers for any other substances. The gender and age differences for alcohol are unsurprising, as evidence has demonstrated young males are over represented in drink driving statistics (Ministry of Transport, 2008). It is possible that males are also more likely to drive under the influence of cannabis and drug combinations for similar reasons as drink driving. A potential explanation for the age difference in methadone drivers is that stabilized methadone users (who are considered unimpaired, see chapter 5) might be older than patients at earlier stages of methadone treatment, who may be advised not to drive.

The relationship between the frequency of drug use and reported drug driving was also examined. For most substances higher frequency of use was positively correlated with drug driving in the previous 12 months. This means that the more often a respondent reported using a drug, the more likely they were to have driven under the influence of that drug in the past year. This supports previous research that identified that dependent drug users are at greater risk of drug driving (Darke, Kelly & Ross, 2003).

Taken together, the international research, key expert opinions, and internet survey responses indicate that drug driving is relatively prevalent in New Zealand. For the internet sample cannabis and alcohol were the substances most commonly driven on in the previous 12 months, with alcohol and cannabis also being the most common drug combination. The relative prevalence of polydrug driving is a concern, due to the associated increased levels of impairment, as is discussed in the next chapter.

## **5. Impairment**

### **5.1 Literature**

When it comes to effects on driving ability, not all drugs have the same effect. It is important to understand how different drugs impair driving so that substances posing the greatest risks to road safety can be targeted. There is a growing body of research evidence that describes the impairing effects of a wide range of substances. The two main types of impairment research are epidemiological crash-culpability studies and experimental simulator or on road driving studies. Crash-culpability studies assess the level of responsibility a driver had for a car crash along with levels of substances present in the driver's blood. These assessments are usually carried out on injured drivers admitted to hospital, or fatally injured drivers. Such studies only provide information about crash involved drivers, and have limited applicability to the general driving population. Simulator or on-road driving studies measure the impact of substance intoxication on actual driving



ability, either in a driving simulator, or in a controlled on-road driving test. These studies are able to identify specific impairments by controlling for variables other than drug impairment, however this lack of “real world” context limits the ability to generalise their results.

It is also necessary to investigate the general public’s understanding of how different drugs impair driving ability to identify discrepancies between actual and perceived driver impairment. Education campaigns can target these discrepancies, providing credible and accurate information to drivers, allowing them to make informed driving decisions.

## **Alcohol**

Alcohol is the substance for which we know the most about in terms of driving impairment, as it has been researched extensively over several decades (Ogden & Moskowitz, 2004). In their review of the past 50 years of alcohol and drug driving research, Ogden and Moskowitz (2004) state that “alcohol is associated with as many fatal collisions as all other drugs combined.” This puts into perspective the relative risks of driving under the influence of drugs and alcohol. Epidemiological and experimental studies have evaluated the threat alcohol impairment poses to road safety. Ogden and Moskowitz (2004) reviewed research that assessed alcohol’s impact on driving related skills such as reaction time, tracking, vigilance, divided attention, and visual functions. Different skills are impaired at different levels of impairment. Tracking, the ability to stay in your lane and follow the road, is impaired at relatively low blood alcohol contents (BAC) if the driver is required to attend to other tasks commonly associated with driving at the same time. A similar pattern of impairment has been noted for vigilance or concentration, which is also impaired at low alcohol doses if the driver is required to divide their attention between tasks. Ogden and Moskowitz (2004) also describe how a driver’s vision is particularly vulnerable to alcohol impairment. A driver under the influence of alcohol may struggle to track moving objects, be slower to recover from glare resulting in temporarily impaired vision, have reduced control over eye movements, and be slower to process visual information. Ogden and Moskowitz (2004) conclude that alcohol impairment is most pronounced when more than one task is demanded of the driver, for example driving on busy city streets and/or dealing with unexpected events such as a mobile phone ringing. This impairment can be observed in drivers with BACs of less than .05 and increases with increasing BAC. The legal BAC limit in New Zealand is .08.

## **Cannabis**

There is a growing amount of research evidence around the impairing effects of cannabis, some of which has been done in New Zealand. A longitudinal birth cohort study of 907 New Zealanders studied from 18 to 21 years of age gathered information on the frequency of cannabis use, traffic accidents, and other driver behaviours and characteristics (Fergusson & Horwood, 2001). The authors reported that cannabis users were more likely to be involved in traffic crashes where they were culpable. However, when other driver behaviours and characteristics were controlled for, the relationship between cannabis use and car crash no longer existed. Fergusson and Horwood (2001) concluded that the increased crash risk reflected the risk taking characteristics of young cannabis users, rather than a direct cannabis-crash relationship. In a later study of the same birth cohort (Fergusson, Horwood & Boden, 2008) a “marginally significant” ( $p=.064$ ) association

between cannabis and motor vehicle crash was observed, even after controlling for driver behaviour and characteristics.

Another New Zealand study by Blows et al. (2005) relied on accident involved drivers self-reporting cannabis use at the time of the accident in an interview with researchers some time later. Self-reported cannabis use for these cases (n=571) was compared to that of control drivers (n=588) randomly selected from the same geographical region around the same time. The authors reported similar finding to Fergusson and Horwood (2001) and Fergusson, Horwood and Boden (2008). Although acute cannabis use initially appeared to be associated with car crash injury, once confounders such as risky driving behaviour were controlled for the relationship was no longer significant. The authors did report a significant association between habitual cannabis use and car crash injury however. The findings from these New Zealand studies indicate that caution must be taken when inferring impairment based on car crash rates for cannabis users. It appears that the relationship between cannabis use and car crash is mediated by a cannabis user's tendency towards risk taking behaviour.

Studies of crash involved drivers have reported mixed results regarding the role of cannabis in motor vehicle crashes. Movig et al. (2004) reported no relationship between cannabis detected in biological samples and car crash in their case-controlled study. Similarly, Longo et al. (2000b) reported that cannabis positive drivers were no more likely to be culpable for their car crash than drivers with no trace of cannabis in their system. However Drummer et al. (2004) found that when only the active and impairing component of cannabis (active tetrahydrocannabinol, or THC) is considered, there is a significantly higher likelihood of driver culpability for active THC positive drivers. Drummer et al. (2004) also reported a culpability by dose relationship for crash involved drivers positive for active THC. This means that the higher the level of active THC detected, the more likely the driver was to be culpable for their crash. Movig et al. (2004) and Longo et al. (2000b) tested for any traces of cannabis including inactive THC metabolites which do not have an impairing effect, and are indicative of past cannabis use only, potentially weakening any relationship between cannabis use and crash risk.

Experimental studies involving simulated or on road driving tests while under the influence of cannabis have produced more consistent evidence of cannabis impairment. When driving under the influence of cannabis participants were more likely to "drift" or "weave" across their lane, have slower reaction times when responding to changes in speed and distances from leading vehicles, have collisions, and drive more slowly (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004; Ramaekers, Robbe & O'Hanlon, 2000; Ramaekers et al., 2004; Robbe, 1998; Ronen et al., 2008). Many of these studies have found that the effects of cannabis on driving are dose dependent and the impairing effects of cannabis become more severe as doses increase (Ramaekers, Robbe & O'Hanlon, 2000; Ramaekers et al., 2004; Robbe, 1998; Ronen et al., 2008). The suggestion that cannabis drivers drive more slowly than non-impaired drivers effectively compensating for any impairment is discussed by Ramaekers et al. (2004). They conclude that the reduction in speed is insufficient to compensate for the overall impairment, including increased reaction times. The compensation argument also fails to account for the higher rate of collisions observed in drivers under the influence of cannabis. Papafotiou, Carter and Stough (2005a) reported that drivers under the influence of cannabis also cease to compensate for their impairment well before the impairing effects of cannabis have worn off.

Some of the world's top cannabis driving researchers collaborated on a meta-analysis of experimental and epidemiological cannabis and driving studies in an effort to identify a per se blood concentration limit for active THC, comparable to a BAC of 0.05 percent (Grotenhermen et al., 2007). The authors agreed that at 7-8ng/ml active THC in blood serum, impairment is equivalent to a BAC of 0.05 percent. Translating this blood cannabis content limit into real world use terms is problematic at best, however this meta-analysis provided reliable evidence that cannabis causes driving impairments comparable to alcohol.

Much research has examined the effects of cannabis on driving ability incorporating a variety of methodological approaches. Although there are considerations such as the underlying risk taking characteristics of cannabis users, compensatory behaviours, and active vs inactive THC testing, overall the evidence suggests that cannabis impairs driving ability and increases a drivers risk of car crash.

### **Stimulants - Amphetamines/Methamphetamines, Ecstasy**

Reviews of amphetamine driving impairment research consistently report mixed findings, largely due to the highly dose dependent relationship between amphetamine use and driving impairment (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004; Vingilis & MacDonald, 2002). Low doses of amphetamines have been reported to improve some cognitive abilities associated with driving such as reaction time and endurance (Kelly, Darke & Ross, 2004; Vingilis & MacDonald, 2002). Silber, Croft, Papafotiou and Stough (2006) examined the effects of low dose amphetamine and methamphetamine on attention and psychomotor performance and found overall improvements in performance with “no direct demonstrations of amphetamine-related impairments”. However in a simulated driving study, Silber, Croft, Papafotiou and Stough (2005) reported that dexamphetamine impaired driving performance during daytime conditions, but not nighttime. The authors explained this discrepancy in performance as due to a “perceptual narrowing” effect associated with dexamphetamine. During daytime conditions the driver is flooded with peripheral information, the processing of which is impaired by dexamphetamine. In contrast, during nighttime conditions (i.e. in the dark) the driver is able to focus attention on the road ahead without the interference of peripheral information.

Studies of crash involved drivers have also failed to find conclusive evidence that driving under the influence of amphetamine or methamphetamine is related to increased risk of motor vehicle crash. Though higher proportions of amphetamine positive drivers are involved in motor vehicle crashes, the relatively small number of crash involved drivers with amphetamines detected in their systems prohibits researchers from conducting meaningful analysis and obtaining statistically significant results (Drummer et al., 2004; Longo et al., 2000b; Movig et al., 2004). Drummer et al. (2004) reported that stimulants were the substances most strongly associated with crash culpability in his case-controlled study of 3398 fatally injured drivers. The authors reported that drivers under the influence of stimulant drugs were 2.3 times more likely to be culpable for their crash, however these results were not statistically significant.

Research on the effects of MDMA or ecstasy on driving ability is limited. Experimental studies of driving under the influence of MDMA on road or in a simulator have found evidence for impairment of some psychomotor and perceptual skills, and improvement in others (Lamers et al., 2003; Ramaekers, Kuypers & Samyn, 2006). Lamers et al. (2003) reported that MDMA caused impairment in tasks demanding divided attention, while

psychomotor performance tasks were either improved or not affected. Ramaekers, Kuypers and Samyn (2006) reported that MDMA improved driver's ability to stay in their lane, reducing weaving or drifting within the lane. However MDMA also caused drivers to over-react to changes in the speed of a leading car, resulting in the driver breaking too hard.

## Opiates

Opiates come in many forms, and are used in different ways. As this review focuses primarily on impairment, all opiates (illicit, prescribed, and diverted) will be discussed in this section.

There is little evidence that opiate drugs cause significant driving impairment, especially for tolerant users, whether the opiates are prescribed medications (i.e. pain medication, or methadone replacement therapy) or illicitly acquired prescription medicines or heroin. Fishbain, Cutler, Rosomoff and Rosomoff (2003) conducted a comprehensive review of opiate impairment research for dependent or tolerant opiate patients. The review included research on opiate impairment and psychomotor abilities, cognition, acute opioid administration, motor vehicle accidents/violations/convictions, and simulated and on-road driving. A total of 48 studies were reviewed and the authors concluded that opiates do not appear to impair driving-related skills in opiate-dependent patients. It should be kept in mind that the Fishbain et al. (2003) review only included research on patients receiving stabilized doses of opiates as part of medical treatment, either as pain relief or methadone replacement therapy.

Another review of opiate dependence and driving included research on illicitly used opiates including heroin. Lenne, Dietze, Rumbold, Redman and Triggs (2000) report a low prevalence of opiates detected in motor vehicle crash studies, ranging from zero percent of fatalities, to five percent of injured drivers in studies from around the world. The authors point out that this low prevalence rate means it is problematic to infer any causal relationship between the prevalence of opiates in accident involved drivers and crash risk. Opiates detected in crash involved drivers might simply reflect the prevalence of opiate use in the general driver population. Lenne et al. (2000) conclude that opiates, whether used under medical supervision or illicitly, have little impact on driving performance, and there is no evidence to suggest that opiate use increases crash risk.

More recent studies of crash involved opiate drivers have reported increased crash risk and culpability rates for opiate users, however none have reached statistical significance (Drummer et al., 2004; Movig et al., 2004). Again, small numbers of opiate positive drivers could explain the lack of statistical significance.

Studies of cognitive function for methadone maintenance patients have found evidence of cognitive impairment (Darke, Sims, McDonald & Wickes, 2000; Gruber et al., 2006). Darke et al. (2000) reported moderate impairments in information processing and problem solving, though these impairments appeared to be related to lifestyle factors associated with drug dependence (high prevalence of head injury, alcohol dependence, history of overdose) rather than a direct result of methadone maintenance. Gruber et al. (2006) reported that cognitive function improved for dependent drug users two months after beginning methadone maintenance therapy, indicating that methadone maintenance alleviates some of the cognitive strain associated with untreated drug dependence. Lenne, Dietze, Rumbold,

Redman and Triggs (2003) compared the performance of stabilised methadone maintenance patients to non-drug-using controls. They reported that there were no differences in driver performance between the two groups, even when alcohol was added. Alcohol impairment was no greater for the methadone using group than the drug-free controls, indicating an absence of a synergistic or additive effect for alcohol and methadone. The authors suggest that methadone maintenance patients should be subject to the same alcohol limits as other drivers.

There is evidence of a dose related response for opiate type drugs, where high doses cause sedation (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004). It has been suggested that this dose related response might explain the lack of evidence for impairment in laboratory studies where doses are low (Kelly, Darke & Ross, 2004). However much of the opiate impairment research reviewed here included stabilised methadone maintenance patients in the first few months of treatment where doses are likely to be similar to those used illicitly (Ministry of Health, 2003). The impairment evident at higher opiate doses is likely to be a road safety issue for illicit opiate users and methadone maintenance patients who continue to use illicit drugs. However the low prevalence of opiate positive drivers in epidemiological research prevents meaningful analysis of the relationship between opiate use and motor vehicle crash.

### **Benzodiazepines**

Of all the pharmaceutical drugs, benzodiazepines have been most thoroughly researched with regard to driving impairment. Experimental studies of benzodiazepine use and driving impairment have found that the drug severely impairs driving performance (de Gier, Hart, Nelemans & Bergman, 1981; Leufkens, Vermeeren, Smink, van Ruitenbeek & Ramaekers, 2007). An early study by de Gier, Hart, Nelemans & Bergman (1981) employed a subjective observer based measure in an on-road actual driving test. Compared to controls, benzodiazepine patients were judged to perform poorly on visual perception and anticipation of events during the driving test. More recently, Leufkens, Vermeeren, Smink, van Ruitenbeek and Ramaekers (2007) reported that benzodiazepines lead to severe impairment in an actual driving task, evidenced by significant increases in drifting within the designated lane.

Several studies have demonstrated increased risk of motor vehicle crash associated with benzodiazepine impairment (Barbone et al., 1998; Longo et al., 2000a; Movig et al., 2004; Neutel, 1995; Neutel, 1998). Barbone et al. (1998) monitored crash rates for people who use prescription drugs over a three year period. Benzodiazepines significantly increased the risk of motor vehicle crash and younger users were at higher risk than older users. Benzodiazepines did not significantly increase the risk of motor vehicle crash for drivers over the age of 65. A similar finding was reported by Neutel (1998) where the risk of motor vehicle crash was lower for elderly benzodiazepine users than young ones. However all benzodiazepine users were at increased risk of traffic crash, regardless of age. Neutel (1995) examined the relationship between filling a benzodiazepine prescription and future admission to hospital for treatment of motor vehicle crash injuries. Neutel's (1995) study involved a large sample of 225,796 benzodiazepine users and 97,862 controls. Benzodiazepine patients were at significantly increased risk of car crash for the first four weeks post prescription, however there was evidence of tolerance to the drug as odds ratios decreased over time, meaning the risk of traffic crash reduced the more time passed after prescription. Studies of injured drivers presenting to emergency departments have also

reported increased risk of traffic crash for benzodiazepine users (Longo et al., 2000a; Movig et al., 2004). In a study of fatally injured drivers in Australia, Drummer et al. (2004) found a positive but not significant relationship between driving under the influence of benzodiazepine and culpable involvement in a motor vehicle crash. The non-significant result in this study is likely due to a lack of statistical power associated with small number of drivers with benzodiazepine in their systems.

A study examining the relationship between benzodiazepine blood concentration and subjective assessments of impairment reported that benzodiazepine impairment appeared to be dose dependent (Bramness, Skurtveit & Morland, 2002). Physicians using a predetermined measure of impairment were more likely to judge an apprehended driver as impaired as blood concentrations of benzodiazepine increased.

Reviews of drug driving research also report that there is substantial evidence that benzodiazepines impair driving ability, that impairment is dose dependent, and that tolerance is experienced by longer term users (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004).

### **Polydrug use**

Drug combinations have been demonstrated to be more impairing than individual substances used alone (Drummer et al., 2004; Kelly, Darke & Ross, 2004; Kerr & Hindmarch, 1998; Longo et al., 2000a; Movig et al., 2004; Ramaekers, Robbe & O'Hanlon, 2000; Robbe, 1998). The most well researched drug combination is that of THC and alcohol as it appears to be the most prevalent, and impairing (Drummer et al., 2003; Longo et al., 2000a). Experimental studies have assessed impairing effects of THC and alcohol combinations in actual driving tests. Ramaekers et al. (2000) measured on road driving performance for drivers after doses of THC and alcohol alone and in combination. They found that when combined, THC and alcohol had a cumulative effect creating greater impairment than either drug alone at the same doses. The authors suggest that this is a difficult issue to address, as the dose of alcohol used in their study was low, remaining under the most commonly accepted BAC of .05 percent at all times. Despite the high level of impairment evident, in a real world situation enforcement officers would be unable to detect this level of impairment in a driver as they would pass an alcohol test due to their low BAC.

Similar results were reported by Robbe (1998). Driver performance was assessed after doses of THC and alcohol, alone and in combination. Robbe (1998) reported that drivers under the per se BAC limit of .05 percent drove in a manner expected for drivers above the limit when cannabis and alcohol were combined. The author also noted that alcohol appears to neutralise or undo the cautious driving approach associated with THC intoxication in experimental settings.

Alcohol and THC combinations have been reported to increase crash risk in epidemiological drug driving studies. Drivers injured or killed while under the influence of alcohol and THC combinations are significantly more likely to be culpable for their crash than drug-free drivers (Drummer et al., 2004; Kelly, Darke & Ross, 2004; Longo et al., 2000b).

Other drug combinations have also been studied, and there has been a focus on alcohol and benzodiazepines due to the apparent severity of impairment induced when these substances are taken together. Like alcohol and THC, benzodiazepine and alcohol combinations can elicit additive effects (Kerr & Hindmarch, 1998; Kelly, Darke & Ross, 2004). Movig et al. (2004) reported that benzodiazepine-alcohol drivers were at 5.1 times the risk of car crash compared to drug-free controls. More generally, Kelly, Darke and Ross (2004) reported that drivers positive for any drug combination were five times more likely to be culpable for a car crash, while Movig et al. (2004) reported a six fold increase in car crash risk for polydrug users, and if one of those drugs was alcohol the risk of car crash increased to 112.2 times that of controls. Driving under the influence of a combination of alcohol and other drugs poses the greatest threat to road safety.

## 5.2 Key expert interviews

When key experts discussed impairment they often called on their experience of people who use drugs in their own areas of work, as well as research evidence. There was generally agreement that many substances had the potential to impair driving, however there was variation of opinion over which substances posed the greatest threats to road safety.

A variety of substances were discussed by the experts including alcohol, cannabis, methamphetamine, methadone, and prescription drugs. Expert seven bases his assessment of driving impairments on his experience with people who use drugs, generalising his observations of drug user's behaviour to the context of driving.

*Interviewer: Now which substances if any do you see poses the biggest drug driving related problem in New Zealand?*

*KE7: That's a difficult question to answer too because any you know any person that's intoxicated behind the wheel, is a possible risk, so they're impaired in some way through whatever the substance is. But I think about certain substances that again going back to the group that we deal with, methamphetamine, because there's that level of agitation that occurs while people are on that substance and so some of the, you know, behaviour that occurs within driving, not necessarily of their own actions, but things that you know, while they're driving are impacted on by other peoples driving and then their reaction to that. People in groups that use cannabis, they tend to be a lot slower in their reactions so that has an impact too, you know that if the conditions are difficult then they are unable to drive to those conditions. I think people that use sedative based substances, you know that ability to become knocked off while they're driving so that has an impact on being able to, their reactions, time to react to different situations. I think some of the things like methadone can be an issue too, people that are on methadone can have the same situation where you know depending on what time they've used the substance will have an impact on their driving if they're driving you know within a certain timeframe after that, so that could have an impact as well.*

Key expert seven acknowledges that different substances produce different effects, and that these are likely to impair driving in different ways. When discussing methamphetamine, expert seven applies his experiences of methamphetamine users being agitated to the context of driving, translating that behaviour as a potential driving

impairment. Cannabis was frequently discussed as a considerable road safety concern. However key expert one describes the compensatory behaviour that has been observed in some experimental research, and expresses his opinion that this compensatory behaviour neutralises driver impairment.

KE1: *But what it does to people is that it tends to inhibit risky behaviour people tend to become more conservative in their decision making, they tend to slow down and most importantly I think is they tend to be aware of their impairment and so they compensate for it by either paying more attention or driving slower or increasing their following distance and this is really well documented in the studies both in lab studies and in actual you know giving someone some Marijuana and sending them out into the street which they've done in a few countries. For example in the Netherlands and in England they've both done studies like that and um and this is what's happened they just find that people compensate for any um impairment. So even though theoretically there might be impairments possible it's not you know ended up like that in reality.*

Other key experts said that cannabis was a major road safety concern, and this was the predominant view. Expert nine described why he believes cannabis is the most impairing substance, including its effects on concentration and fatigue. He also mentions that despite being considered a dangerous drug in other contexts, methamphetamine is less of a threat to road safety.

Interviewer: *Okay so which substances if any do you think pose the biggest drug driving related problems in NZ?*

KE9: *Marijuana is one of concern from patient interviews and it's a two fold thing both marijuana in acute use so which again there's some overseas research showing that it alters your ability to concentrate and perform fine motor activities. So that's current use but also there's the hangover component then the day afterwards you're at a party or things you're sleepy and all that sort of stuff so it increases fatigue. And we know that again sleep, going to sleep and having an accident is a common scenario that occurs. So marijuana by far and away would be the one drug of concern. There's not a lot of strong linkages with anything else and in fact there's some evidence that methamphetamine actually drives better when you're on it but worse when you're off it so.*

Key expert two raises the issue of increased risks for polydrug users. In the following extract she is referring to part of the Land Transport Amendment Act 2009 that stipulates that drivers who fail an alcohol breath test with a BAC over .08 percent will not be required to undergo any further testing for other drug impairment.

KE2: *...there's also an issue with when Police have said they're not going to test anyone that's already pinged for alcohol which we don't agree with. We think that people who have clearly got mixed alcohol and drugs are much more unsafe [...] so if you've got a point 08 alcohol level and drugs in your system you should be getting a penalty for the point 15 alcohol not the point 08.*

Key expert two points out that polydrug users are more impaired and are therefore a greater risk to road safety. She says that this should be reflected in the enforcement and punitive systems set up around drug driving.



Key expert nine highlights the perceived disparity in focus on illicit versus prescription drugs, pointing out the medicines can be just as impairing as illegal drugs.

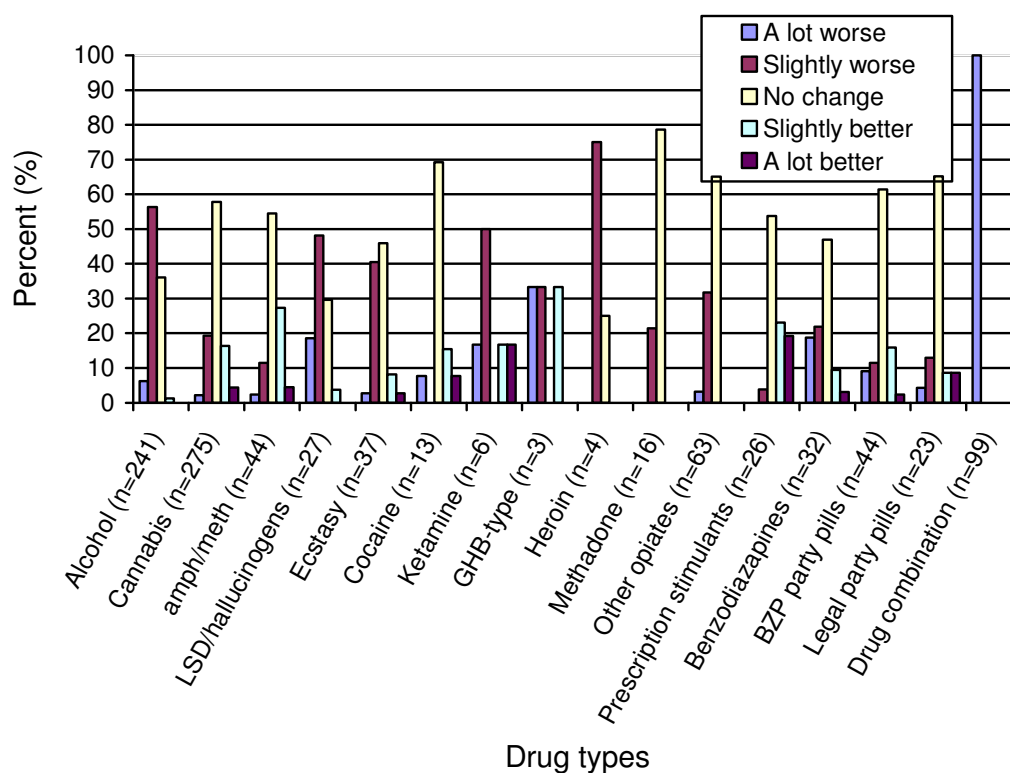
KE9: *You see medications are another one that's been looked at internationally like just you know your 80 year old who's on drugs from the doctor, those drugs are just as dangerous in affecting driving as illegal drugs and that's not being looked into properly either.*

All the key experts acknowledged that impaired driving is a road safety issue, though there was disagreement over which substances were of greatest concern. Some expert opinions were at odds with the research literature, while other's understanding of the research informed their discussions.

### 5.3 Perceptions of impairment reported by internet respondents

This section of the internet survey sought to gauge drug drivers perceptions of the impact substances had on their driving ability. Drivers who reported driving under the influence of alcohol or within three hours of using a substance in the previous 12 months were then asked what impact they thought that substance had had on their driving ability. Figure 5.1 presents the drug driver's responses to the question "the last time you drove within three hours after using [substance], what impact did it have on your driving ability?"

Figure 5.1: Drug driver's perceptions of their driving ability last time they drove under the influence of a substance.



There was considerable variation in the perceived effects of different drugs on driving ability. The substance most commonly perceived to have the greatest negative effect on driving ability was drug combinations. One hundred percent (n=99) of polydrug drivers felt their driving was a lot worse the last time they drove under the influence of more than one substance. There was no other single substance for which the majority of drug drivers felt their ability to drive was a lot worse. For most other substances the majority of drug drivers believed there was no effect on their driving abilities including cannabis (57.8%, n=275), amphetamine or methamphetamine (54.5%, n=44), ecstasy (45.9%, n=37), cocaine (69.2%, n=13), methadone (78.6%, n=16), other opiates (65.1%, n=63), prescribed stimulants (53.8%, n=26), benzodiazepines (46.9%, n=32), BZP party pills (61.4%, n=44), and BZP-free party pills (65.2%, n=23). Most drink drivers said their driving was slightly worse the last time they drove under the influence (56.4%, n=241), as did drivers under the influence of LSD/hallucinogens (48.1%, n=27), Ketamine (50.0%, n=6), and heroin (75.0%, n=4).

#### **5.4 Accidents**

Six point six percent (n=74) of drivers had been involved in a traffic accident in which they were at fault in the previous 12 months.

Accident involved drivers were asked to report whether they were under the influence of any substances at the time. Drivers self-reported that 5.3 percent (n=4) were under the influence of alcohol, 6.7 percent (n=5) were driving within three hours of using an illicit substance, 2.7 percent (n=2) were driving within three hours of using a prescription drug, 2.7 percent (n=2) were driving after taking a combination of substances, and 82.7 percent (n=62) had not consumed any drugs or alcohol. It should be noted that the small numbers of respondents reporting crash involvement limits further statistical analysis of crash risk.

#### **5.5 Summary and discussion**

The evidence around the impairing effects of different drugs is growing. There is an abundance of research describing the harmful impact alcohol has on road safety (Ogden & Moskowitz, 2004), and the key experts were in agreement that alcohol remains of primary concern when tackling the issue of impaired driving. This was not strongly reflected in drink driving respondent's perceptions of the effects alcohol had on their driving abilities. Drink drivers tended to say their driving was only slightly worse or not effected at all. Despite years of intensive social marketing around the dangers of drink driving, over a third (36.1%) of drink drivers said being under the influence of alcohol had no effect on their driving abilities. It appears there remains a sub-group of drink drivers who are unlikely to change their behaviour as they perceive no impairment when driving under the influence of alcohol.

There is an increasing amount of evidence around the effects of cannabis, or active THC on driving ability. Local research (Fergusson & Horwood, 2001) has identified that at least some of the increased risk of motor vehicle crash for cannabis users is explained by the risk taking characteristics of young cannabis users themselves, rather than direct cannabis impairment. Though some studies of crash involved drivers have failed to report a relationship between cannabis use and motor vehicle crash (Longo et al., 2000b; Movig et al., 2004), studies that examined only the impairing active THC have demonstrated an increased risk of crash for drivers under the influence of cannabis (Drummer et al, 2004).

Cannabis impairment has also been demonstrated in simulator and on-road driving studies, where cannabis drivers tend to weave across their lane, drive more slowly, and suffer from increased reaction times (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004; Ramaekers, Robbe & O'Hanlon, 2000; Ramaekers et al., 2004; Robbe, 1998; Ronen et al., 2008). It has been argued that cannabis drivers compensate for their impairment by driving more slowly and being more cautious, however this is disputed by some researchers (Papafotiou, Carter & Stough, 2005a; Ramaekers et al., 2004) who explain that drivers compensatory behaviour is insufficient to negate the risks, and drivers stop compensating for their impairment long before the impairment has faded.

Key experts identified cannabis impairment as a road safety concern, though the level of understanding of how cannabis impairs driving was varied. One expert described the compensatory behaviour some attribute to cannabis impairment, while others acknowledged that cannabis effects attention and motor skills.

Most cannabis drivers in the internet survey felt that their driving was not affected by the drug the last time they drove under the influence, however approximately similar numbers of cannabis drivers felt their driving was either better (20.8%) or worse (21.5%) than usual. This apparent lack of awareness of cannabis impairment reflects the need for education around the effects of cannabis on driving, and the ineffectiveness of compensatory behaviours. It also highlights the potential challenges in designing and implementing education countermeasures that target perceptions of cannabis impairment.

There were some substances for which the evidence suggests minimal impairment for drivers. Research on stimulant drugs has failed to produce conclusive evidence of impairment (Drummer et al., 2004; Silber, Croft, Papafotiou and Stough, 2005; Silber et al., 2006). Key expert comments on methamphetamine were mixed, with some suggesting driving might be impaired by aggressive behaviour associated with methamphetamine use in other contexts, while at least one expert noted the potential for methamphetamine to improve driving abilities. Internet respondents who had driven under the influence of stimulant drugs predominantly reported no change in their driving abilities, and those who had driven under the influence of prescribed stimulants reported no change or a tendency towards better driving ability. This is supported by research literature, as appropriately prescribed stimulant medication for disorders such as attention deficit hyperactivity disorder improve driving abilities (Barkley, Murphy, O'Connell & Connor, 2005).

Similar results are reported for opiate drivers. There is little research evidence of impairment for stabilised opiate users, including prescription opiate and methadone users, and heroin users (Fishbain et al., 2003). Key experts rarely mentioned opiates in terms of impairment. Internet respondents who had driven under the influence of opiate drugs typically reported no change in their driving ability, while those who did experience some impairment reported that their driving was only slightly worse than normal. The respondent's perceptions of driving impairment accurately reflect the research evidence for minimal impairment.

There is substantial research evidence describing impairment for drivers under the influence of benzodiazepines (Barbone et al., 1998; de Gier, Hart, Nelemans & Bergman, 1981; Leufkens, Vermeeren, Smink, van Ruitenbeek & Ramaekers, 2007; Longo et al., 2000a; Movig et al., 2004; Neutel, 1995; Neutel, 1998). Key experts tended to focus their conversations on illicit drugs and driving, though a few pointed out that some medications

are just as dangerous in terms of impairment. Internet respondents who had driven under the influence of benzodiazepines generally perceived no change in their ability to drive, however those who did perceive that benzodiazepines impacted their driving tended to feel their driving was negatively effected. Given the strong evidence for benzodiazepine impairment, it appears that awareness of the dangers of driving under the influence of this substance is low. These findings highlight that the risks of driving under the influence of benzodiazepines need to be emphasized at point of prescription, by both doctors and pharmacists. They also highlight issues around tolerance. Stabilised long-term benzodiazepine users may no longer be impaired, and they may be advised by medical professionals that they are safe to drive. This could help explain why many benzodiazepine users tended to perceive that their driving was not effected by their drug use.

There was one area where there was consensus between the research evidence, key experts, and internet respondents. The risks associated with driving under the influence of multiple substances were acknowledged by all. Research evidence demonstrates that for some substances, the addition of alcohol creates an additive effect, where small doses of each substance equate to equivalent impairment levels of large doses of one substance. This is especially true for alcohol and cannabis or alcohol and benzodiazepine combinations. (Drummer et al., 2004; Kelly, Darke & Ross, 2004; Kerr & Hindmarch, 1998; Longo et al., 2000b; Movig et al., 2004; Ramaekers, Robbe & O'Hanlon, 2000; Robbe, 1998). Key experts expressed concern over the relatively high risks of polydrug driving, and the impact on driving ability was also recognized by internet respondents, all of whom reported that their driving was a lot worse the last time they drove under the influence of multiple substances.

Drug driving impairment is a complex issue. Different substances cause different impairments, and it's not just the type of substance taken that affects impairment levels. The amount of substance taken, which combination of substances is consumed, the route of administration, time between ingestion and driving, as well as personal variables such as tolerance and health status of the user all impact on how severely a driver is likely to be impaired. The internet respondents' subjective perceptions of the impact a substance had on their driving ability reflects how they *felt* about their driving performance on that occasion, and not *actual* driving performance. A participant may have been more or less impaired than they perceived themselves to be, depending on all the personal and contextual variables that impact on impairment. Further research is needed to not only accurately ascertain impairment but also to understand the perceptions of the community so that we are able to raise driver awareness of substance induced impairment.

## **6. Risk perception, knowledge, and understanding of drug driving**

### **6.1 Literature**

Drug driving research has predominantly focused on impairment and prevalence of driving under the influence. However, understanding what people know and think about drug driving is important, as these attitudes inform the development of countermeasures to reduce drug driving harm. Measuring drug driving risk perceptions and knowledge for the general population provides insight into whether informed decisions are made by drivers,

and where information should be targeted to ensure drivers understand the risks before getting behind the wheel. Very little research has examined general population attitudes towards drug driving, and this review focuses on research on attitudes of drug driver populations.

The basic premise behind measuring risk perception is that this information exposes over- and underestimations of the dangers involved in behaviour relative to expert opinion (Slovic, 1987). Experts can then attempt to influence population perceptions of risk in either direction via education and information. The resulting changes in attitudes are said to influence behaviour (Slovic, 1987). Understanding how drug drivers perceive the risks of their behaviour should inform us as to which attitudes to target to reduce drug driving. Road safety campaigns should aim to increase risk awareness with the aim of reducing drug driving behaviour. Ongoing assessment of changes in risk perception for drug driving could evaluate the effectiveness of drug driving campaigns. However, risk perception research in other drug and health related areas has demonstrated that attitude change alone may not be enough to impact behaviour. Behaviour is influenced by many different variables, and humans employ various strategies to manage risk without avoiding the original behaviour (for example, Brewer, Weinstein, Cuite, and Herrington, 2004; Gamma, Jerome, Mathias, Liechti, & Sumnall, 2005), so targeting the behaviour directly (through enforcement, for example) may also be necessary to elicit change (see chapter 7 on Countermeasures).

As research has provided a clearer picture of drug driving impairment and its prevalence, researchers have begun to examine the attitudes of drug drivers. Such research endeavours to better appreciate how drug drivers perceive the risks of their behaviour in an effort to understand if and how drug drivers' attitudes might be influenced, with the aim of modifying their behaviours to reduce drug driving. Davey, Davey and Obst (2005) reported that attitudes towards drug driving were significant predictors of drug driving behaviour, meaning that more favourable attitudes towards drug driving lead to increased likelihood of drug driving behaviour. The attitudes most strongly linked to drug driving behaviour were those relating to what the participant's peers thought about drug driving and the perceived harms, or risks. The authors also examined attitudes to drink driving. Interestingly one of the attitudes closely linked to drink driving was the perceived risk of apprehension – drink drivers were inclined to think it was acceptable to drink drive as long as they were not caught. Other researchers have reported that the perceived risk of detection or apprehension by enforcement agencies is a key predictor for drug driving (Aitken, Kerger & Crofts, 2000; Davey, et al., 2005; Degenhardt et al., 2006; Lenne et al., 2001; McIntosh, O'Brien & McKeganey, 2008; Neale, 2001).

McIntosh, O'Brien and McKeganey (2008) conducted a qualitative study of drug driving among people with problem drug use. They reported that people with drug dependency felt the risk of being detected was more influential than risks to personal safety, but that the risks of detection were low. People who used drugs reported that they would be less inclined to drive under the influence if they thought they might get caught, and that raising awareness of the risks car crash would be largely ineffective. Aitken, Kerger and Crofts (2000) reported similar attitudes towards drug driving from focus groups and a survey of 159 heroin users. Both samples perceived the risks of car crash as lower than the risk of detection. People who used drugs recreationally in Neale's (2001) qualitative study of drug driving experiences also reported that they thought the risk of being caught driving under the influence of drugs was low. This was supported by drug driver's experiences, where

few participants had been pulled over while driving under the influence and none had been charged. The findings from these studies indicate that the perceived risk of apprehension might be a powerful predictor of drug driving behaviour. Drug drivers place more emphasis on the risk of detection than on risks to their personal safety; however they perceive the risk of detection as low. Highlighting risks of crash involvement might be less effective in preventing drug driving than increasing the perceived likelihood of being caught by enforcement agencies.

Different substances are perceived to affect driving ability in different ways. Degenhardt et al. (2006) interviewed 273 nightclub attendees about their drug use and transport methods. Driving under the influence of heroin was most commonly rated as 'very dangerous' (71% of participants), followed by alcohol (59% of participants). Driving under the influence of crystal methamphetamine, cocaine, ecstasy, and speed were rated 'very dangerous' by 39 – 48 percent of participants. Cannabis was least frequently considered 'very dangerous' for driving, with only 36 percent of participants rating it as such. The authors also examined the perceived risk of detection for driving under the influence of different substances. Participants tended to rate the chances of apprehension as 'not very likely' or 'not likely' for all substances except alcohol.

Driving under the influence of cannabis is commonly reported to be perceived as a relatively safe behaviour (Aitken, Kerger & Crofts, 2000; Degenhardt et al., 2006; Lenne et al., 2001; Neale, 2001). A pilot study by Lenne et al. (2001) examined the attitudes of 67 young people who had driven under the influence of cannabis. Less than half the participants (46%) believed that cannabis had a negative impact on their driving abilities, and 57 percent thought that driving under the influence of cannabis did not increase their risk of car crash. Some cannabis drivers (12%) felt their driving was improved due compensatory behaviours that 'increased awareness and concentration'. However there was an acceptance by the majority of participants (90%) that cannabis combined with alcohol did negatively impact driving ability.

Understanding how the risks of drug driving are perceived guides the development of education and prevention strategies. Drug drivers perceive the risks of drug driving to be low, and place greater emphasis on the risks of detection than risks to personal safety. Cannabis is generally perceived to be the substance posing the least risk when driving under the influence. Based on the research evidence, it seems increasing the perceived risks of apprehension for drug driving would be the most effective way to reduce it. It should be noted that there is a dearth of evidence around general population attitudes towards drug driving, including attitudes about driving on commonly used pharmaceutical drugs. The current study aimed to begin to fill this gap in the evidence, and section 6.3 presents attitude data for a sample from the general driver population.

## **6.2 Key expert interviews**

Key experts spoke in detail about public attitudes and knowledge of drug driving. Experts were unanimous in their assessment of public knowledge, believing the general population to be poorly informed or even misinformed when it came to the risks of drug driving.

Key expert three describes how the young people she has worked with feel they compensate for cannabis impairment.

KE3: *Well certainly one thing we get feedback on from young people around drug driving is they feel like they're almost like a safer driver if they are stoned than if they were drunk because oh no well I drive really slowly, I am really cautious and a bit paranoid, that's the sort of, and bear in mind I'm speaking very anecdotally here...*

In the above excerpt it is interesting that the key expert describes how young people seem to be choosing between alcohol and cannabis, and cannabis is perceived to be the “safer” option when driving. Young people may no longer feel safe to drink and drive and their perceptions of risk around cannabis driving are minor by comparison.

Many key experts noted public misperceptions around which substances are more or less dangerous when driving under the influence. Several experts emphasized that the general public base their assessments of driving risk around how ‘hard’ a drug is perceived to be, either via the media or New Zealand’s illegal drug classificatory system. This was described as an inappropriate way to assess the risks of driving under the influence of substances. Key expert five discusses how the general public misunderstands drug driving risk for different substances.

KE5: *Yeah, they overestimate P's risk, they underestimate cannabis risk, they don't understand benzos and combining benzos with other drug risk, and most people know very little about opiates at all and it seems to be really a function more, their risk perception seems to be more a function of how much the media demonises the drug and also how acculturated we are as a society to a drug being present, being around.*

Key expert six also believes the public are ill informed around the risks of drug driving. She alludes to the fact that the public rely on the stigma attached to some drugs over others, and some users over others when assessing drug driving risk. And this method of risk assessment fails to take actual impairment into account.

KE6: *Very ignorant, also very, very ignorant, because once again it's around the illicit nature, it's not around impairment. So you know, so they would see this ex criminal come out from jail smoking cannabis who is compared to say an 80 year old lady who's on say 40mg of benzodiazepine a day and has a brandy in the middle of the day driving, they would see that as less of a concern. When in actual fact, she's a higher risk to the public than what the other person would be, in driving.*

Key expert 11 also emphasises the lack of public understanding around illegal versus pharmaceutical drugs. At the core of many key expert statements is a belief that the general public simply do not have knowledge around drug driving impairment.

Interviewer: *...what's your impression on the public's attitudes towards drug driving?*

KE11: *The drug driving fairly uninformed. I think that they have a tendency to look at things in black and white and not really aware of the greys in-between particularly around legitimate pharmaceutical supplies verses illicit, and also really the interactions that these drugs within the human body and other behavioural consequences of particularly long term or regular drug users verses naïve and new drug users. So yes I'd say they are relatively uninformed.*

Key expert 11 also describes how our illegal classificatory system can misguide people when it comes to drug driving risks. She highlights the discrepancy between driving impairment and how drugs are classified within our legal system. A drugs position in our illegal classification system does not accurately reflect the risks it poses to road safety.

*KE11: Well I think there would be very little knowledge around Benzodiazepine for instance and their effects. I think that there is a lack of understanding around cannabis really and I think there is also a general desire to see so called hard drugs collectively so whilst heroin or opiate based illicit drugs and amphetamine type drugs would be considered on the same scale and when in fact they're entirely different drugs with entirely different properties.*

Key expert five describes the social acceptability of cannabis use and the impact that might be having on drug driving awareness. She also explains that unlike drink driving, there is a lack of clarity for the public over whether smoking and driving is a road safety risk.

*KE5: Yeah, and the complacency about cannabis, it's terrible, I mean you can go on to lounge rooms all over the country and in pride of place you've got posters reading don't drink and drive, smoke and fly; complete lack of awareness of what the science is showing and there's just a real she'll be right attitude and an uncomfortable tolerance of the behaviour from people who aren't smokers or smokers and drivers. But the concerns are very fuzzy so it's not like they jump up and go oh you can't drink and drive, don't get in that car because you can't smoke and drive because it's just very fuzzy.*

At the centre of key experts' concerns over public attitudes and knowledge around drug driving is the perception that people do not know enough about impairment. The public are forced to assess the risks of drug driving using misleading sources of information, such as the media coverage of drug issues, the classificatory system under the law, or pre-existing stigmas or perceptions of drugs and the people who use them.

### **6.3 Internet respondents' risk perception, knowledge, and understanding of drug driving**

#### **Risk perceptions**

All internet respondents (n=1166) were asked "how safe or dangerous (in terms of driving ability) do you think it is to drive under the influence of the following drugs?" Respondents rated driving under the influence of each of the 16 drugs from one (safe) to five (dangerous).

The mean score for each drug is presented in figure 6.1. All drugs were rated towards the dangerous end of the scale, none were rated three (neutral) or less. The substance identified as most dangerous for driving under the influence was alcohol, with a mean risk rating score (m) of 4.80 (SD=.53). Other drugs that were perceived to be most dangerous tended to be illegal, with LSD/hallucinogens (m=4.79, SD=.57), heroin (m=4.69, SD=.66) and GHB-type drugs (m=4.67, SD=.67) being rated as next most dangerous after alcohol.

The drug perceived to be least dangerous was cannabis (m=3.96, SD=1.29). Cannabis had the largest standard deviation of all the drugs, indicating the most variation in perceived

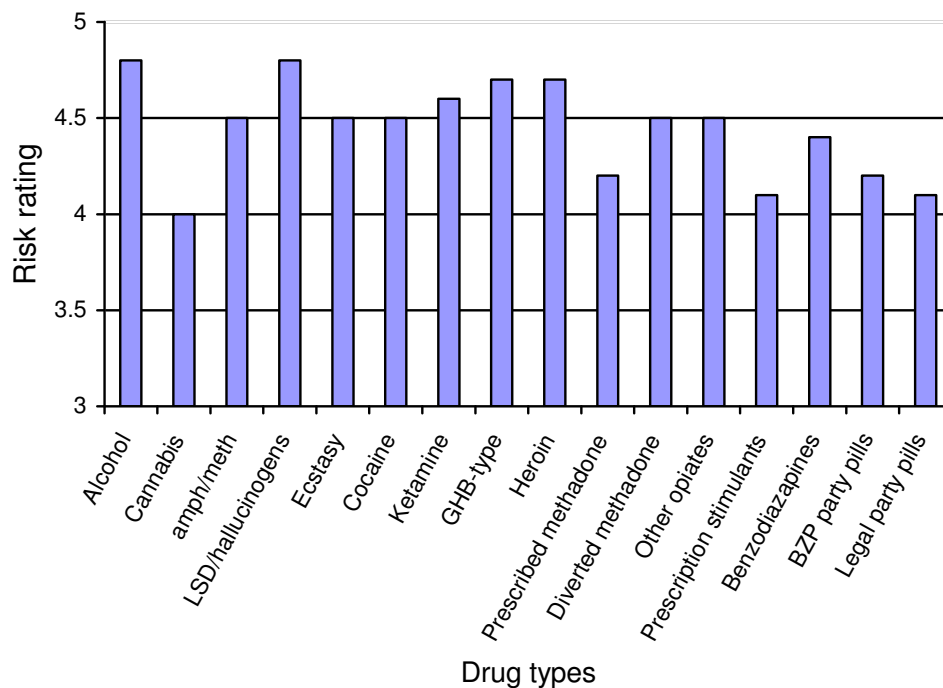


risk among the sample. Other drugs that were perceived to be less dangerous were all stimulants and included legal party pills ( $m=4.09$ ,  $SD=1.13$ ), prescription stimulants ( $m=4.12$ ,  $SD=1.10$ ), and BZP party pills ( $m=4.16$ ,  $SD=1.10$ ).

An interesting discrepancy can be seen between risk ratings for prescribed and diverted methadone, where prescribed methadone ( $m=4.17$ ,  $SD=1.09$ ) was rated as less dangerous than diverted methadone ( $m=4.52$ ,  $SD=.79$ ). Whether participants were basing this judgment simply on legal status or whether they considered the impact the source of a substance might have on impairment is not clear.

It should be kept in mind that despite the evident differences, all substances were rated at the dangerous end of the scale. This suggests an overall disapproval of drug driving, regardless of the substances involved.

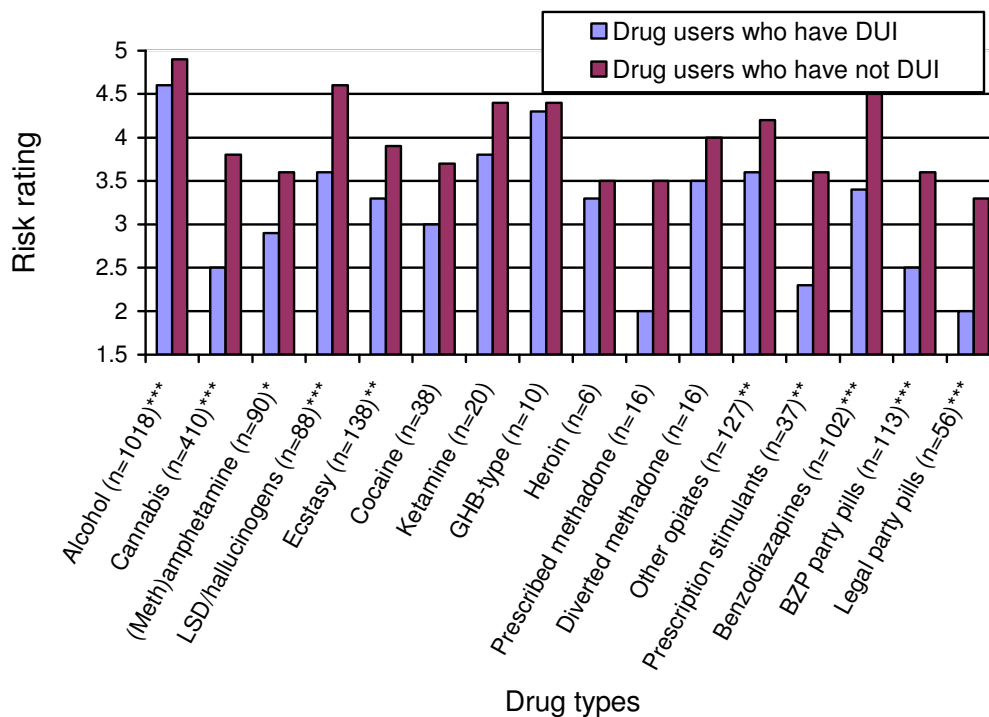
Figure 6.1: Mean risk ratings for driving under the influence of drugs ( $n=1166$ ).



## Risk perceptions of drug drivers versus non-drug drivers

Figure 6.2 presents perceived risk ratings for people who use drugs only, comparing the ratings of drug users who have driven under the influence in the previous 12 months to those drug users who have not. It is important to understand how attitudes differ between drug users who do and do not choose to drive under the influence, as driving under the influence is the behaviour of interest, not drug use per se.

Figure 6.2: Mean risk ratings for drug users who have and have not driven under the influence in the previous 12 months.



\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

There were significant differences between the risk perceptions of people who use drugs who had driven under the influence in the previous 12 months and those who had not. Overall, drug drivers tended to perceive driving under the influence of substances as less risky than drug users who had not driven under the influence. Drink drivers rated drink driving as significantly less risky than drinkers who had not driven under the influence in the previous 12 months ( $t(1016) = -6.8, p < .001$ ). There were significant differences in risk perception for other drugs. People who use drugs who had driven under the influence perceived less risk when driving under the influence than those who had not driven but used cannabis ( $t(408) = -10.7, p < .001$ ), amphetamines/ methamphetamines ( $t(88) = -2.4, p < .05$ ), LSD/hallucinogens ( $t(86) = -4.7, p < .001$ ), ecstasy ( $t(136) = -2.7, p < .01$ ), other opiates ( $t(125) = -2.8, p < .01$ ), prescription stimulants ( $t(35) = -3.3, p < .01$ ), benzodiazepines

( $t(100)=-5.1, p<.001$ ), BZP party pills ( $t(111)=-4.6, p<.001$ ), and legal party pills ( $t(54)=-4.4, p<.001$ ).

It is important to remember that in figure 6.2 all respondents were users of the substances they rated. This means that both drug drivers and drug users who had not driven were able to call on their personal experiences of drug effects when evaluating the risks of driving under the influence. The disparity between drug drivers and those who had not driven cannot therefore be explained by non-drug users overestimating risk based on inexperience of actual drug effects. Identifying the reasoning behind these differences in attitude could be key to the design of drug driving prevention programmes.

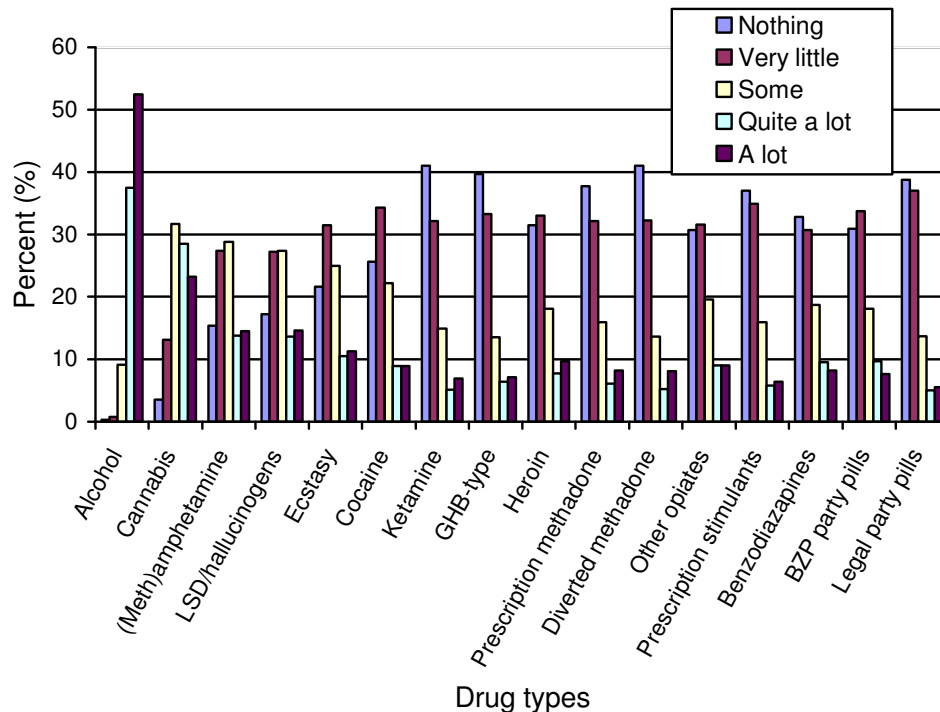
### **Knowledge and perception of time following drug use when it is safe to drive**

All internet survey respondents ( $n=1166$ ) were asked to rate “How much do you know about the following drugs in relation to their effect on driving ability?” for the 16 drugs investigated. The rating scale included five options, ‘nothing’, ‘very little’, ‘some’, ‘quite a lot’, and ‘a lot’.

Figure 6.3 presents self-reported levels of knowledge of drug effects on driving for all internet respondents (global margin of error at 95% confidence interval = 2.9%). Overall, and with the exception of alcohol, knowledge of drug effects was poor. Alcohol was the only substance for which the majority of respondents reported knowing ‘a lot’ (52.2%) or ‘quite a lot’ (37.5%) about its effects on driving ability. Relative to the other drugs, respondents reported knowing somewhat more about cannabis with 31.7 percent claiming to know ‘some’ and 28.5 percent ‘quite a lot’ about the drugs effects on driving. Respondents tended to report knowing less about the effects of other substances. Respondents knew ‘some’ (28.8%) or ‘very little’ (27.4%) about the effects of amphetamines/methamphetamines, and reported similar levels of knowledge for LSD/hallucinogens (‘some’ 27.4%, ‘very little’ 27.2%). The majority of respondents report knowing ‘very little’ about ecstasy (31.5%), cocaine (34.3%), heroin (33.0%), other opiates (31.6%), and BZP party pills (33.7%). For all the other substances the majority of respondents reported knowing ‘nothing’ about the drugs effects on driving (ketamine 41.0%, GHB type substances 39.7%, prescription methadone 37.7%, diverted methadone 41.0%, prescription stimulants 37.0%, benzodiazepines 32.8%, and legal party pills 38.8%).

It is interesting to note that despite respondents acknowledging they know little to nothing about the effects of most drugs on driving, they still perceived these substances to be dangerous when asked to rate the risks of driving under the influence. This might demonstrate a tendency for respondents to err on the side of caution when thinking about drug driving risks, even if they know nothing about the impairing effects of that substance. Alternatively, respondents might be applying what they already know about drugs from other contexts to their risk assessment for driving under the influence.

Figure 6.3: Self reported levels of knowledge regarding the effects of substances on driving ability.

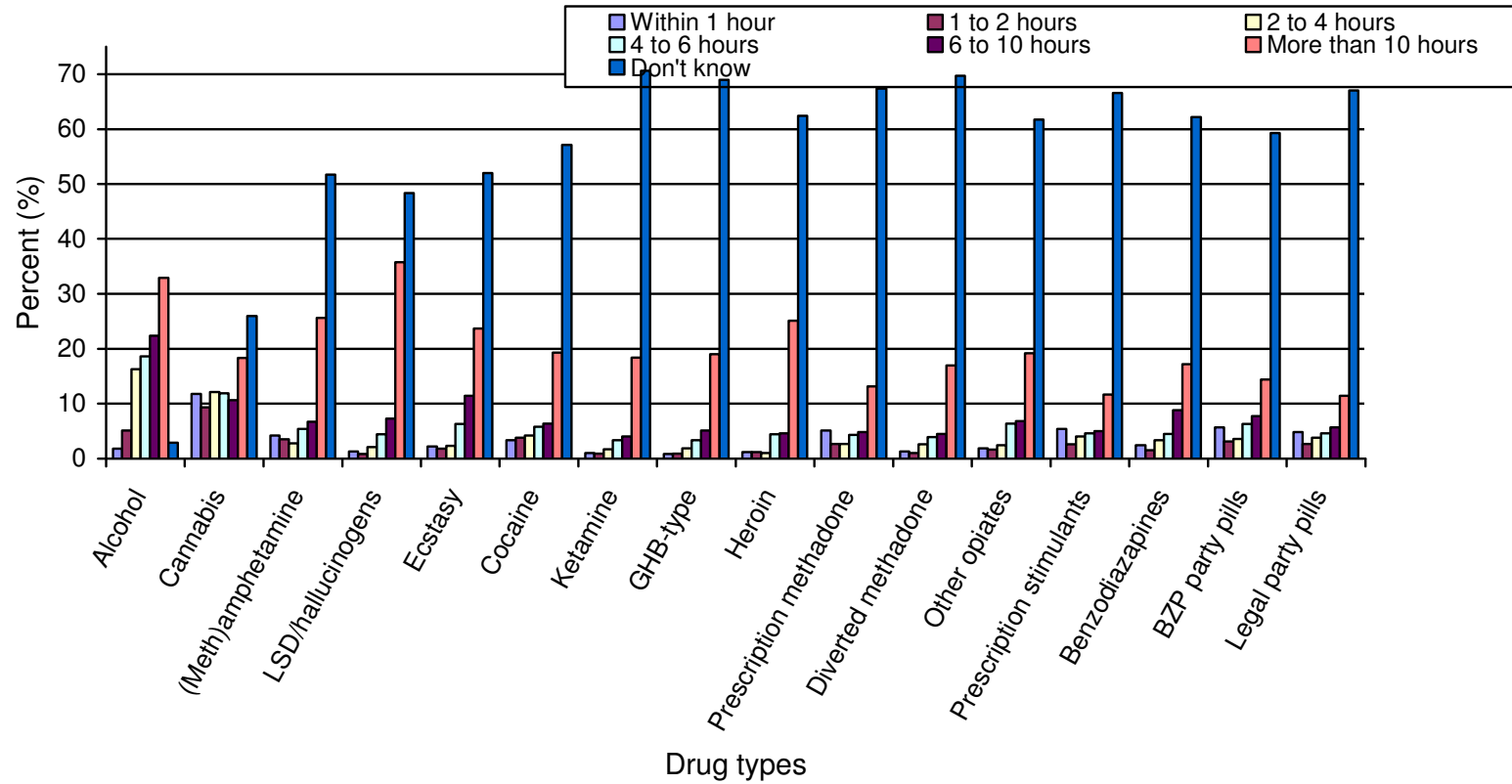


All respondents (n=1166, global margin of error at 95% confidence interval = 2.9%) were asked “How long after consuming enough to feel under the influence of the following drugs would it be safe to drive?” for the 16 drugs investigated. The response options were ‘within 1 hour’, ‘1 to 2 hours’, ‘2 to 4 hours’, ‘4 to 6 hours’, ‘6 to 10 hours’, ‘more than 10 hours’, and ‘don’t know’.

Responses were consistent with levels of knowledge reported for the previous question, as the majority of respondents said they did not know what timeframe is appropriate between consumption and safe driving for most drugs. The only substance for which most respondents reported that they knew how long they should wait after being under the influence before driving was alcohol, with 97.1 percent of respondents selecting some period of time for safe driving. Respondents most commonly reported that alcohol drinkers should wait more than 10 hours before driving (32.9%).

The most common response to time required between consumption and safe driving for cannabis was ‘don’t know’ (26.0%); however the majority of respondents (74.0%) did select a timeframe for safe driving. Around half (51.6%) the respondents selected a timeframe for safe driving after LSD/hallucinogen consumption, while the other half (48.4%) did not know what timeframe was appropriate. For all other substances the majority of respondents did not know how long to wait after feeling under the influence before driving (amphetamine/methamphetamine 51.7%, ecstasy 52.2%, cocaine 57.1%, ketamine 70.6%, GHB-type substances 69.0%, heroin 62.4%, prescribed methadone 67.4%, diverted methadone 69.7%, other opiates 61.7%, prescription stimulants 66.6%, benzodiazepines 62.2%, BZP party pills 59.3%, and legal party pills 67.0%).

Figure 6.4: Perceived time required between consumption of substances and 'safe' driving (n=1166).



The key finding around the respondent's knowledge of time required between being under the influence and safe driving is that most respondents do not know how long a driver must wait before driving. It should be noted that the 'don't know' response was probably the most appropriate for many substances. There was not enough information given to participants for them to make a safe assessment. Variables such as amount of substance consumed, body mass of user, food and water intake, health status of user, fatigue and level of intoxication make it impossible for even an expert to nominate a safe delay between intoxication and unimpaired driving.

#### **6.4 Summary and discussion**

The purpose of measuring respondents' risk perceptions and knowledge around drugs and driving was to better understand the attitudes that help guide decisions to drug drive or not. When designing approaches to reduce drug driving it is essential to target the attitudes that support drug driving behaviour with the aim of adjusting the attitudes and affecting the behaviour.

Previous research has demonstrated that perceptions of risk and attitudes towards drug driving can be predictive of drug driving behaviour (Aitken, Kerger & Crofts, 2000; Davey, Davey and Obst, 2005; Davey et al., 2005; Degenhardt et al., 2006; Lenne et al., 2001; McIntosh, O'Brien & McKeganey, 2008; Neale, 2001). For this reason it was important to gauge key expert assessments of public knowledge and measure risk perception and knowledge in our New Zealand internet sample.

Key experts were unanimous in their assessment of public understanding of drug driving. All agreed that there was a lack of knowledge around drug driving and misperceptions around which substances posed the greatest risks were common. Several key experts highlighted the discrepancy between levels of public concern over driving under the influence of illegal drugs compared to pharmaceuticals. Others pointed out the relative complacency around driving under the influence of cannabis. Key experts also described how stigma might shape people's thinking about different drugs and different drug users, where those stigmatized in other contexts are assumed to be dangerous for driving under the influence also.

The lack of knowledge described by key experts was evident in responses to the internet survey. Respondents appeared to rate the risk of drug driving based on what they knew about each drug in other contexts. However, the risks associated with driving under the influence of a given substance may not align with the risks of use of that substance in another environment. Drugs that are commonly perceived to be 'dangerous' or 'hard' may not be associated with driving risk. Public opinion of driving impairment may be skewed by perceptions of harm or relative safety based on existing hierarchies of drugs, such as New Zealand's ABC classification system for illicit drugs, or media coverage of drug related crime.

The comparison of perceived risk for people who use drugs who do and do not drive under the influence provided evidence that attitudes differ even within the drug user group. Both have experienced the effects of drugs, so both are making a decision to drive or not with an appreciation for the effects of each substance. It was clear that people who use drugs who do drug drive perceive their behaviour to be less dangerous than people who use drugs who do not drive under the influence. Further research should examine this

difference in attitudes in more detail to ascertain which factors influence some people who use drugs to avoid driving under the influence and vice versa. These differences in attitude are key to identifying appropriate messages for prevention and education campaigns.

When respondents were asked how much they knew about the impact of drugs on driving ability, and length of time required between being under the influence of a drug and safe driving, the predominant response was 'don't know'. Respondents reported that they knew very little about the impact most drugs have on driving, however they reported knowing 'a lot' about alcohol and 'some' or 'quite a lot' about cannabis. Relative to other illicit or pharmaceutical drugs, respondents reported being somewhat knowledgeable about cannabis.

Despite reporting some knowledge of cannabis driving risk, respondents rated it as the least dangerous substance for driving under the influence. This perception of relative safety is not supported by the research evidence reviewed in previous chapters. This discrepancy between public perception and actual risk is likely to exist for other drugs. While respondents were relatively confident in their knowledge of cannabis driving, they were not so for other drugs. Respondents underestimated the risks of cannabis driving (relative to other substances), yet they claimed to know more about it. Given that cannabis was rated as the least dangerous drug for driving under the influence, and respondents were relatively confident in their knowledge of the effects of cannabis on driving, this is an area that should be targeted in New Zealand drug driving road safety campaigns. Research evidence reviewed in previous sections of this report has demonstrated that cannabis impairment is indeed a road safety issue.

Overall, the concerns discussed by key experts and the risk perceptions and self-reported levels of knowledge for internet respondents provide evidence that the general public may be poorly informed about the risks of drug driving. Understanding the difference in attitudes between people who use drugs who do and do not drug drive will be crucial in the development of drug driving awareness campaigns. Of primary importance is educating drivers on the risks of cannabis driving, as this appears to be the area in which drivers are more likely to be misinformed.

## **7. Countermeasures**

### **7.1 Literature**

Road safety countermeasures are initiatives that aim to reduce car crash injury and death by targeting risky driving behaviours such as speeding, driving under the influence of drugs or alcohol, or driving while distracted. These initiatives aim to reduce the prevalence of risky driving behaviour and reinforce safe driving practices.

Road safety initiatives generally fall into one of two categories: detection and enforcement, or public education and awareness campaigns. The two types of initiative are usually used in combination. The most commonly recognized road safety initiative in New Zealand targets drink driving. So far, in New Zealand, detection and enforcement initiatives generally involve roadside testing of drivers for alcohol. Evidential breath testing allows police to evaluate whether a driver's BAC is over the legally permitted limit, and enforce a penalty when the legal limit is exceeded. Public awareness or education campaigns rely on

mass media advertising to raise awareness of the risks of driving under the influence of alcohol. The highlighted risks are twofold: the public are educated as to the risks of car crash when driving drunk, and to the risks of being caught and penalised by police if driving with excess breath alcohol. It is well understood that the most effective road safety initiatives include both enforcement and educational aspects (Delaney, Lough, Whelan & Cameron, 2004; Fell, 2001; Sweedler et al., 2004). This has been borne out in international drink driving trends, where comprehensive multi-faceted initiatives to reduce driving under the influence of alcohol have led to reductions in car crash injuries and deaths (Sweedler et al., 2004). This is the approach might also be effective in dealing with driving under the influence of other substances.

### **Drug driving – the New Zealand context**

Until recently, drug driving has not been actively targeted as a road safety issue in New Zealand. However the Land Transport Amendment Bill (No. 4) was introduced to parliament in 2007 and proposed to strengthen police powers to allow assessment of drug impairment in drivers. At the time of writing, the bill had been passed<sup>1</sup>, but was yet to be implemented. Under the new law, if an officer has good cause to suspect that a driver has consumed a drug or drugs, such as swerving across lanes or erratic driving, police will be able to follow up a breath alcohol test with a compulsory standard field sobriety test (SFST), to check for drug impairment.

In New Zealand this test will be called the Compulsory Impairment Test (CIT). The CIT could be carried out regardless of the result of a breath alcohol test if other drug impairment is still suspected by an officer. However, in practice, a Police officer would not proceed to a CIT if the driver fails an evidential breath test for alcohol, as the primary aim of removing the impaired driver from the road will have been achieved (NZ Police, Personal communication). Failure to complete the CIT to the satisfaction of a Police officer would then require the driver to undergo an evidential blood test. (If a driver refuses to undergo a CIT they can be charged with refusing the CIT, which carries the same penalties as an impaired driving offence). The presence of a drug or drugs in a blood sample would result in a charge of “driving while impaired and with blood that contains evidence of use of controlled drug or prescription medicine”. The two elements that are required to prove the offence are evidence of impairment as shown by unsatisfactory completion of the CIT, and the presence of drug(s) in the blood specimen. As analysis of blood samples cannot be done on the spot, evidence of impairment (unsatisfactory completion of the CIT) will be sufficient for a police officer to forbid the driver from driving for a number of hours. Forbidding the driver from driving achieves the immediate goal of removing an impaired driver from the road, regardless of the cause of impairment.

Random drug testing<sup>2</sup> at checkpoints is not allowed for under the new legislation, primarily due to the impracticality of requiring drivers to undergo the time consuming CIT. Detaining drivers for the time required to carry out the test may also constitute a breach of the New Zealand Bill of Rights Act, where a person cannot be unreasonably detained without cause to suspect that they have committed an offence. This means that drivers will only be tested for drug impairment when an officer has reason to suspect they have

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<sup>1</sup> It is now known as the Land Transport Amendment Act 2009

<sup>2</sup> Under a random testing regime a Police officer would be able to test drivers without first having to establish good cause to suspect a driver has consumed a drug or drugs.



consumed a drug or drugs, such as witnessing a driver weaving across lanes, driving erratically, or by their personal demeanour when they are stopped and spoken to by the Police.

The Land Transport Amendment Act 2009 is a first step in strengthening enforcement as part of an initiative to reduce drug driving in New Zealand. As the proposed enforcement initiatives in New Zealand revolve around CIT and blood analysis, these methods will be the focus of the review in this chapter.

### **Enforcement and drug driving prevention**

As previously described, the most effective road safety initiatives combine enforcement and awareness or education campaigns. Enforcement initiatives like selective or random breath testing (SBT or RBT) for alcohol are rarely undertaken without some level of publicity. The rationale behind SBT and RBT is that increasing the perceived risk of arrest will act as a deterrent from driving under the influence. To be effective the public must be made aware that the risk of apprehension has increased (Shults et al., 2001). This makes it very difficult to assess the efficacy of enforcement initiatives alone, as the impact of the accompanying awareness campaigns cannot be separated from the impact of RBT. Shults et al. (2001) conducted a systematic review of drink driving interventions and reported that sobriety check points are “effective in preventing alcohol-impaired driving, alcohol related crashes, and associated fatal and nonfatal injuries” (Shults et al., 2001). The interventions reviewed included varying levels of publicity however the main effect was attributed to the presence of selective and random breath testing sites. It is likely that a similar impact might be observed on drug driving with the implementation of drug testing.

The risk of detection has been identified as an influential factor in the decision to drive under the influence or not. The risks of detection for drug driving are often perceived to be low, though drug drivers are more concerned about being caught drug driving than they are about the risks to their personal safety (Aitken, Kerger & Crofts, 2000; McIntosh, O’Brien & McKeganey, 2008; Neale, 2001). Jones, Donnelly, Swift and Weatherburn (2006) interviewed 320 recent cannabis users about what would deter them from driving under the influence. Participants were presented with different scenarios where the likelihood of apprehension and the severity of penalties were manipulated. The authors reported that participants were less likely to say they’d drive under the influence when the likelihood of apprehension was high. The severity of the penalty had no effect on cannabis users’ decisions to drive under the influence or not.

Increasing the perceived risk of apprehension appears to be an effective initiative to reduce driving under the influence of alcohol, and potentially other substances as well. To achieve this requires some actual increase in risk of apprehension through strengthened enforcement, as well as publicity around the increased likelihood of detection to facilitate awareness of the risks.

### **Standard Field Sobriety Testing (SFST) or Compulsory Impairment Test (CIT)**

The SFST is a behavioural test for identifying driver impairment. Though the form of test to be used in New Zealand is yet to be publicly defined, the test format used extensively overseas typically involves three components. The following description of the SFST is taken from Papafotiou, Carter and Stough (2005a) and Rubenzer (2008). The first test is

called 'Horizontal and vertical gaze nystagmus' (HGN and VGN) and is conducted once for each eye. It requires the driver to focus on an object in front of their face and track its movement left and right (HGN) and up and down (VGN). An impaired driver will have trouble smoothly following the object, drifting off target then suddenly jumping back on target again. This failure to smoothly follow the target is called nystagmus and constitutes failure of the test. An additional eye test will be used in the New Zealand version of the test, the CIT, that assesses the size of the drivers pupils (NZ Police, Personal communication). Details of this particular test have not been described publicly at the time of writing, so a review of this method is not appropriate.

The second test is called the 'Walk and turn'. The driver is asked to take nine heel-to-toe steps along a straight line, then turn and repeat the steps in the opposite direction. There are eight signs of impairment in this task: losing balance at the start of the test, starting the test before instructions have been completed, stepping off the line, not touching heel to toe, using arms to maintain balance, improper turn (not as demonstrated), stopping mid-test, and taking the wrong number of steps. Exhibiting two or more of these signs of impairment, or not completing the test constitutes failure to complete the test to the satisfaction of an officer.

The final test is called the 'One leg stand'. This test requires the driver to stand on one leg with the raised leg stretched out in front of them. The driver must then count to from 1000 to 1030. There are four signs of impairment for this test: placing the raised foot on the ground, hopping, swaying, and using arms to balance. The driver fails to satisfactorily complete the test if they exhibit two or more of these signs of impairment, or if they place their raised foot on the ground more than three times, or did not complete the test.

The SFST has been criticized for its subjectivity, and limited robust research evidence of its efficacy for alcohol and other substances (Rubenzer, 2008). Rubenzer (2008) reviewed empirical research of SFST for alcohol impairment and concluded that there were "many deficiencies and unanswered questions". The author reported that much of the SFST research on alcohol impairment was not conducted under appropriately rigorous methodological conditions and other variables that might interfere with test results (such as medical or psychiatric conditions, fatigue, time of day, anxiety or fear, age, and environmental factors such as police strobe lights and weather conditions) have not been investigated. It should be noted that in the New Zealand context, however, a Police officer will have the discretion to conduct the CIT in a more appropriate location if they feel there is likely to be environmental interference in the location where the driver was stopped. Rubenzer (2008) also questioned the way each test is scored, and suggests that the reliability, validity and discriminant validity of each sign of impairment must be determined. Overall, Rubenzer (2008) expressed that there was not enough empirical evidence to support the ongoing use of the SFST to detect alcohol impairment. In New Zealand, however, the SFST or CIT alone will not be enough to charge a driver with drug driving. A Police officer will first have to have good cause to suspect the driver has consumed a drug or drugs before they can require the driver to undergo the CIT. Unsatisfactory completion of the CIT will be followed up with an evidential blood test which must show the presence of a controlled drug or prescription medicine in order for the evidential components of the offense to be met. No one will be charged with drug driving on the basis of a CIT alone.

Despite Rubenzer's (2008) criticisms of the SFST for alcohol impairment, there is some evidence that it is a more effective tool in identifying cannabis impairment (Papafotiou, Carter & Stough, 2005a; Papafotiou, Carter & Stough, 2005b). In Papafotiou, Carter, and Stough's (2005a&b) studies 40 participants received varying doses of THC then completed the SFST and a driving simulator test. In their first paper (2005a) the authors reported that THC caused impairment detected by the driving simulator test that was also detectable by the SFST. The authors conclude that the SFST is an appropriate tool for detecting cannabis impairment. However these results must be interpreted with caution. The authors report that while high percentages (between 71.8% and 100%) of cannabis impaired drivers were correctly identified as impaired by the SFST, low percentages (between 0.0% and 61.5%) of unimpaired drivers were correctly identified as unimpaired. The relatively high true positive rate for identifying cannabis impaired drivers came at the cost of unacceptably high false positive rates for unimpaired drivers. In the context of New Zealand's new drug driving testing regime, an added layer of protection from misidentification of impairment is afforded to drivers by the requirement for good cause to suspect the consumption of a drug or drugs prior to impairment testing. The combination of an officer witnessing erratic or unsteady driving, or personal demeanour when spoken to, and a driver's subsequent failure of a CIT, ensures that regardless of the cause, an impaired driver is temporarily taken off the road.

In Papafotiou, Carter and Stough's (2005b) study, the relationship between THC dose and SFST sensitivity was examined from the same sample as the previous study (2005a). The authors reported that as THC doses increased so did the sensitivity of the SFST, indicating that the more impaired the driver the greater the accuracy of the SFST.

The SFST has also been evaluated for detection of amphetamine impairment by Silber, Papafotiou, Croft and Stough (2005). The authors examined the effects of various doses of dexamphetamine and methamphetamine. The SFST was unable to detect amphetamine impairment, or in other words, amphetamines did not impair performance on the SFST. Indeed, the true positive rates for amphetamine detection in this study were lower than the false positive rates reported for THC impairment by Papafotiou, Carter and Stough (2005a), indicating a driver is more likely to be misidentified as THC impaired, than correctly identified as amphetamine impaired. However, in the New Zealand version of the SFST, the CIT, the addition of a test for pupil size may increase the likelihood of detecting amphetamine impairment compared to the version of the SFST reviewed by Papafotiou, Carter and Stough (2005a). Evaluation of this component of the CIT as it is applied in New Zealand will be important to assess the CIT's efficacy in detecting amphetamine impairment.

Saliva testing is an alternative to the SFST that has been implemented in several states in Australia, as outlined in Mallick et al. (2007). Testing for the presence of drugs in saliva has been found to be more reliable than testing for drugs in urine (Toennes, Kauert, Steinmeyer & Moeller, 2005). When a driver is suspected of driving while impaired or is stopped at a random drug test site they are asked to provide a saliva sample. The sample is analysed on the spot using test kits. An advantage of saliva testing is that it is a more objective measure than the SFST as it does not rely on the judgment of a Police officer. A saliva test can be conducted in similar ways to breathalyzer tests where the driver may not even need to exit their vehicle. Saliva tests used in Australia are only able to check for cannabis, methamphetamine, MDMA, benzodiazepines and opiates (Mallick et al., 2007).

Despite the objective nature of saliva testing, there are several disadvantages associated with this method of drug testing. Saliva tests cannot determine whether a driver is impaired by a substance, only whether the substance is present in the saliva sample. The SFST or CIT will detect impairment, rather than just the presence of a drug. Saliva testing effectively employs a zero tolerance level for drug use and driving, even though there may be no driving impairment at the time of testing. Saliva testing also requires the collection of driver's saliva. This could be a problem in the New Zealand context as collection of specimen samples constitutes 'search and seizure', and this would have to be defined as 'reasonable' under the New Zealand Bill of Rights Act (Ministry of Transport, Personal communication). The collection of saliva might also be problematic where the effects of some drugs cause a reduction in saliva production and Police are unable to collect enough saliva to conduct the test (Verstraete & Raes, 2006). Verstraete (2005) reviewed oral fluid testing research. He reported that saliva test kits took up to 20 minutes to process samples and produced unacceptably high rates of false positives and negatives. If random testing were to be introduced using saliva testing, detention of a driver for 20 minutes without good cause would be considered unreasonable under the New Zealand Bill of Rights Act. Accuracy and speed of processing is improving as newer test kits are developed. Verstraete (2005) suggests that positive saliva tests should be followed up with an evidential blood test to confirm the presence of drugs in a driver's system. The Rosita-2 Project evaluated the efficacy of a variety of saliva test kits over a three year period and across multiple countries (Verstraete & Raes, 2006). Different saliva test kits provided different levels of accuracy and reliability for detecting different substances, though the authors concluded that no single test was reliable enough to be used for roadside screening of drivers. As saliva test kit technology develops further, saliva testing might become an alternative to the SFST or CIT, offering an objective measure of drug presence that should be followed up with an evidential blood test. However, the merits of such a zero tolerance test should be weighed against the detection of actual impairment offered by the SFST or CIT.

### **Blood testing**

Blood testing has long been established as the most accurate method of determining which and how much of a substance is in a drivers system. After failing the SFST, New Zealand drivers will then be required to submit to a blood test. There will be no per se limits for substances detected in blood as there is for alcohol, and any trace of a controlled or prescription drug will be taken as evidence of driving under the influence.

An issue that has been raised in relation to blood testing is that different substances metabolize at different rates. Some substances are flushed from the body as or soon after impairment fades, while others may be detected in blood for some time after impairment has ceased. Cannabis is one such drug. Acute cannabis impairment usually only lasts for three to four hours, though inactive THC metabolites can be detected in blood for several days (Grotenhermen et al., 2007). Only active THC detected in blood has a psychoactive effect and should be treated as evidence of impairment. Under New Zealand's new drug driving laws, only active THC in the blood will be tested for, under the new offence of driving while impaired and with evidence in the bloodstream of a controlled drug (i.e. a drug that is classified under the Misuse of Drugs Act 1975) or a prescription medicine (NZ Police, Personal communication, 9 June, 2009).

## **Mass media campaigns**

Mass media campaigns have been implemented in New Zealand and around the world to improve road safety. They disseminate information to the general public about specific road safety issues with the aim of increasing awareness and changing attitudes and behaviours. To the best of our knowledge, there has been no evaluation of drug driving media campaigns, so much of our knowledge around the efficacy of mass media road safety campaigns comes from drink driving campaigns. New Zealand has implemented several mass media road safety campaigns in the past, primarily focusing on drink driving and speeding. Macpherson and Lewis (1998) evaluated a New Zealand publicity campaign implemented in 1995 that aimed to reduce road fatalities and accidents. The campaign involved the screening of graphic advertisements that demonstrated the trauma of alcohol related car crash. The media campaign replicated one from Victoria, Australia, however the New Zealand campaign was not linked to any associated enforcement programme. The authors reported that fatalities did reduce over the course of the campaign, however the road toll was already trending downwards prior to the start of the campaign. Road accidents actually increased over the period of the campaign, and the rate of drink driving detected by evidential breath tests remained stable. The authors concluded that the impact of the advertisements was negligible and that there was not a substantial relationship between the advertising campaign and drink driving behaviour. This was in contrast to the Victorian campaign from which the New Zealand advertisements were based. The Victorian campaign was evaluated as reducing drink driving. The authors concluded that the combination of media advertising with enforcement was responsible for the positive effects reported for the Australian campaign. A re-evaluation of the same media campaign by Tay (2001) assessed the effectiveness of the campaign using crash data. Including compulsory breath testing as part of the campaign, Tay (2001) reported that the road safety campaign “was effective in reducing the number of serious casualties in the first two years of the campaign” (Tay, 2001). This suggests that enforcement associated with a mass media campaign increases the efficacy of the overall programme.

Delaney, Lough, Whelan and Cameron (2004) reviewed mass media campaigns in road safety. They highlighted the difficulty in evaluating media campaigns as it is impossible to isolate the impact of the advertisements from other associated activities such as enforcement and publicity outside of the advertisements themselves. They also described how the effectiveness of a campaign is dependent on the measure used during evaluation. Awareness of road safety issues is more readily impacted than actual driving behaviour. Despite the difficulties in accurately evaluating mass media road safety campaigns, the authors identified three key characteristics of effective mass media campaigns. Effective campaigns were more likely to be based on a psychological theory, and to have been researched prior to design and implementation. Successful campaigns were also more likely to involve supporting activities, including associated publicity and enforcement initiatives. The authors also explained that campaigns were more effective when the messages were persuasive rather than informative, and emotional rather than rational. These characteristics are likely to apply to effective drug driving media campaigns also, and the research literature around drink driving campaigns will be important in the development and implementation of mass media drug driving campaigns.

## **Summary**

Drug driving prevention initiatives are most effective when they employ both enforcement and public education components. New legislation in New Zealand aims to strengthen enforcement aspects of drug driving prevention, and the addition of some publicity around increased risks of apprehension should improve the impact of the new enforcement measures. There are reservations around the reliability and validity of the SFST, and the cost of false positives and negatives will need to be closely monitored. Follow-up blood tests should protect drivers from wrongful conviction, however, the inconvenience of blood testing and being forbidden from driving should be limited to as few individuals as possible.

## 7.2 Key expert interviews

Key experts identified many of the issues discussed in the literature review. The overarching theme was support for measures that reduce driving under the influence of drugs, though many identified issues or problems with the suggested methods of tackling drug driving.

Key expert three was in agreement with the research literature that a good drug driving prevention initiative will need to encompass both education and enforcement aspects.

KE3: *... I don't know that even alcohol and drunk driving rates would have come down if it hadn't been for effective enforcement, and as much education as you can do which I strongly believe in, I don't think is ever going to be the answer without enforcement.*

Key expert three goes on to highlight the potential problems associated with educating young people on drug driving.

KE3: *At the moment one of our key messages, or one of our key stances [...], is we don't go in and tell students don't drink, because we know they're going to drink. Instead we say if you're going to drink, don't drive, or have nothing to drink before you drive. Whereas we can't go in to a school or work with high school students and say it's ok if you're going to go and get stoned, just don't drive.*

In this excerpt, expert three raises the issue of how to educate people on the risks of drug driving without appearing to condone the use of illegal drugs. Her concerns indicate that messages that have been employed for drink driving may not be directly transferable to prevention campaigns for drug driving.

Several key experts discussed the underlying dependence issues that some drug drivers might be experiencing, and whether or not the established and proposed penalties will really address the drug problem behind the drug driving problem.

KE2: *... this is an issue with lifestyle isn't it. You are talking about someone whose lifestyle is to take drugs every day probably and they're going to drive, and so I think it's an enormously difficult issue to deal with. [...]. And I think some of these people they've not just got a driving problem, you know, they've got a work problem, they've got a health problem, they've got family problems, you know the whole network of agencies that could get involved in that not just fine them or take their car off them or send them off to prison, you know. So it's about dealing with the culture and treating addiction.*

Key expert two describes how driving under the influence is only one part of a range of problematic behaviours associated with drug dependence. She suggests that apprehension for drug driving could be an opportunity for a multi-agency approach to dealing with the underlying drug problem. Key expert seven's comments were along similar lines.

KE7: *You know I think when we deal with people, because this may be the start of somebody that's entering into an addictive lifestyle, or it may be somebody that's maybe further along that pathway already and I think we've got to try and match the consequences to what it is that we're dealing with in front of us. [...] I think there needs to be a strong link to you know if we're doing compulsory drug testing for impairment and that depending on the history of that individual there may be need for possibly compulsory alcohol and drug assessment or you know something that would match up that this is not about imprisoning you know young men and women because I don't think that that would have a necessarily positive outcome long term, that may not stop them doing what they're doing.*

Key expert seven also sees a drug driving arrest as an opportunity to tackle what could be a dependence issue, by providing individuals with access to drug and alcohol assessment. He also suggests that penalties for drug driving should be appropriate to the history and dependence issues of the individual. Key expert nine also acknowledges the presence of underlying addictions for some drug drivers, but also the need for a clear message that drug drivers will be penalised.

KE9: *...making it recognised that if you do harm to others or potential harm to others when you're under the influence of a drug you will be penalised. I think it's very important and then also offering but increasing rehabilitation and so on in support for people who actually have you know an addiction quality to their habits so if they wanted to modify their habits to stop smoking and driving or drug use in driving they've got ways of accessing rehabilitation and help with addiction services to get off it. Because you can't just expect people to just stop their behaviour because they do have an associated addiction. I mean that would be something that I personally would like to see in the punishment side of it as well so you get you know detected, punished with some form of licensing, but you're made to go to like a compulsory rehab or at least a counselling process and that is actually part of the legislation. But that money has to be put up to provide that service because otherwise you can't complete it.*

At the end of key expert nine's comments about drug driving and addiction he raises an important issue. Services will need to be funded to cater to the influx in drug drivers being referred for assessment and treatment if such penalties are to be imposed.

Key experts also discussed the proposed enforcement initiatives in the Land Transport Amendment Bill (No.4)<sup>3</sup>. Key expert eight describes the bill in terms of a starting point from which further initiatives can be developed. He explains that drug driving prevention has lagged behind drink driving initiatives, but that our experiences dealing with drink driving will be valuable tools in the prevention of drug driving.

KE8: *I think that at this stage the drug driving provisions in the bill as its introduced is a good leap forward. I think that we are to some extent in the same situation as we were forty*

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<sup>3</sup> Now known as the Land Transport Amendment Act 2009

*years ago in the drink driving area and so I think that the bill is starting off on a sort of similar footing to where we were then. However that doesn't mean of course that we're going to take forty years to get to where we are in alcohol today because we have a lot of lessons to be able to take from that but I think that we've got a good starting point in the bill.*

Key expert five explains that she believes the schedule needs to be specific about which drugs should be prioritised from a road safety perspective.

*KE5: It needs the addition of a risk drug schedule, that's very important. The reason for that is we need to focus attention on classes that warrant attention by police prosecutors and the public. It's problematic, the linkage to the Misuse of Drugs Act schedule because that was not created with traffic safety in mind and it also adds value judgements to the drugs and we don't want to do that, I mean it's never been helpful to say to drink drivers alcohol's bad, it's more helpful to talk about it in a non-judgemental way. And the classes that drugs are under, under the Misuse of Drugs Act, have no relation to their road safety profiles, cannabis is down bottom, P is up the top, that's the reverse of the road safety situation.*

Key expert five is highlighting that drugs classified as most dangerous under the Misuse of Drugs Act may not necessarily pose the biggest threats to road safety. She also suggests that the value judgements placed on drugs can be unhelpful when educating the public on drug driving.

Few key experts discussed the actual testing regime proposed by the bill; however key expert 11 raised some concerns.

*Interviewer: What are your feelings around road side testing for drug impairment?*

*KE11: That it needs to be very carefully trialled and evaluated to ensure that there isn't any adverse increased harm as a consequence of that roadside testing.*

Key expert 11 acknowledges that the testing regime has the potential to increase harm as well as reduce it. He suggests that the evaluation of the new measures should be a priority to ensure its effectiveness. Key expert 11 also expresses concern over the SFST.

*KE11: ...I think that the fact that the field sobriety test takes a judgement call on behalf of the police can cause difficulties. And that consistency and approach and or a profiling type attitude might become an unintended consequence. And I would be a little bit cautious around these sorts of things.*

The subjectivity of the SFST is raised as an issue by key expert 11. The potential for racial profiling targeting young male Māori drivers was debated in parliament during the first reading of the Land Transport Amendment Bill (No. 4)<sup>4</sup> (Hansard, 2007). Ongoing monitoring and evaluation of the new testing regime will be essential to ensure profiling does not result in minority groups being subjected to unnecessary blood testing.

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<sup>4</sup> Now known as the Land Transport Amendment Act 2009



Overall there was cautious support from key experts for initiatives to prevent drug driving. Drug driving arrest was identified as an opportunity to provide assessment and treatment for drivers with dependency issues, though funding for such programmes must be adequate. The Land Transport Amendment Bill (No. 4)<sup>5</sup> was described as a good starting point for drug driving prevention, though one expert expressed reservations about the subjectivity of the SFST and the need for rigorous evaluation of the testing programme.

### 7.3 Internet survey respondents

Internet respondents were asked a series of questions designed to provide insight to how best to design or market drug driving countermeasures. They focused on how drug driving information is delivered, the decision to drug drive or not and what influences that decision, the likelihood of future driving under the influence, attitudes toward and experiences of breath testing for alcohol, and attitudes toward drug driving and testing.

#### Sources of information

Internet respondents (n=1166) were asked “Where have you got your knowledge and information about drugs (other than alcohol) and driving in the past?” and “Where would you like to get your knowledge and information about drugs (other than alcohol) and driving in the future?” The response options can be seen in figure 7.1.

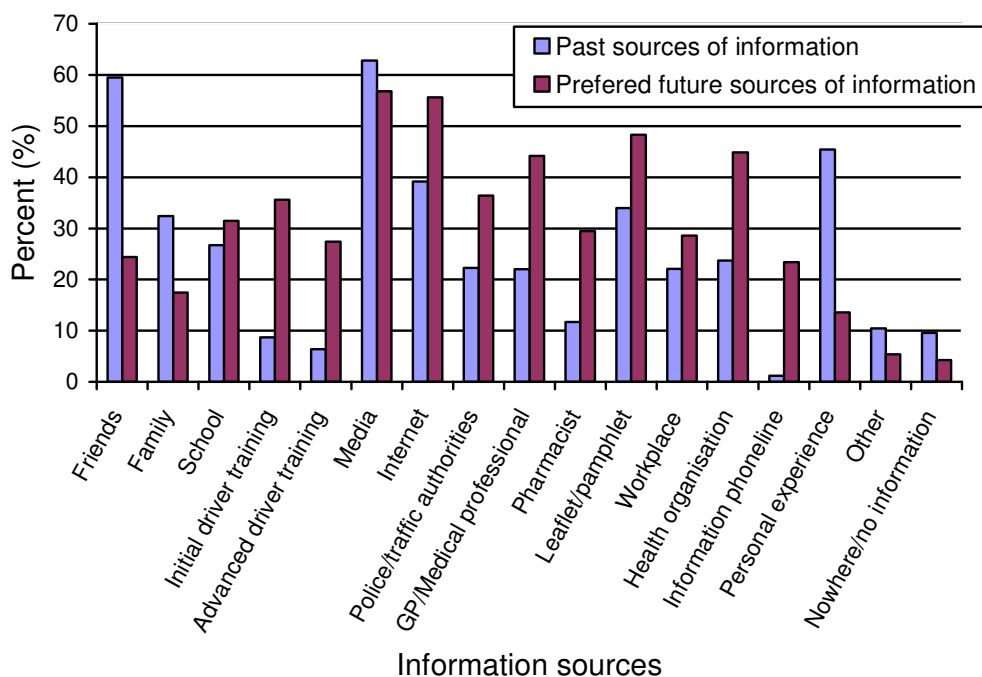
The most common source of past drug driving information was the media (62.8%) closely followed by friends (59.5%) and personal experience (45.4%). The least common sources of past drug driving information were information phone line (1.2%), advanced driver training (6.4%) and initial driver training (8.7%).

The most popular sources of future information were the media (56.8%), the internet (55.6%), and leaflets or pamphlets (48.3%). The most unpopular sources for future information were no information at all (4.3%), other sources of information not listed (5.4%), and personal experience (13.6%).

Figure 7.1: Sources of information about drugs other than alcohol and driving for all respondents

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<sup>5</sup> Now known as the Land Transport Amendment Act 2009



\*Global margin of error at 95% confidence interval is 2.9%

The media already appears to play a primary role in providing drug driving information, and is also the preferred source for future information, indicating it could be the logical starting point for publicity around drug driving in the future. It is interesting that the top three most preferred sources of future drug driving information are all impersonal resources requiring no interaction with other people. The illegal status of many substances may mean that drivers would feel more comfortable sourcing information anonymously. Drug driving campaigns should focus on these avenues of information distribution. This finding also highlights that people may be vulnerable to sensationalist or inaccurate information that is sometimes reported around illicit drugs by the media. There may be a need to provide accurate information about drugs and driving to the media to encourage informed reporting.

### Driving related decisions on drugs and driving

Internet respondents who reported using substances in the previous 12 months were also asked whether they had “made the decision not to drive after using [substance] in the last 12 months?” This question was primarily asked in order to identify the reasons for deciding not to drive under the influence in the follow-up question “The last time you made the decision not to drive after using [substance], what were the main reasons for your decision?”

The percentages of people who use drugs who had decided not to drive under the influence in the previous 12 months are presented in table 7.1. These percentages should be interpreted with caution, as there are confounding interpretations of the question. Some people who use drugs may have selected ‘No’ in response to this question because

they have not been in the position of having to make the decision to drive under the influence or not in the past 12 months (e.g. by always having alternative transport arranged). Other people who use drugs may have selected 'No' because they have chosen to drive under the influence every time they have been presented with the decision to drive or not. This question was asked for the sole purpose of filtering respondents for the follow up question presented in table 7.2. Percentages in table 7.1 should not be interpreted as an indication of drug driving prevalence.

Table 7.1: Percentage of substance users deciding not to drive after substance use in previous 12 months.

Substance (number of users)	Users who reported making the decision not to drive after consumption in previous 12 months	
	n	%
Alcohol (n=1018)	812	79.8
Cannabis (n=410)	158	38.5
Amphetamines/ methamphetamines (n=88)	18	20.5
LSD/ hallucinogens (n=88)	50	56.8
Ecstasy (n=138)	47	34.1
Cocaine (n=38)	3	7.9

Ketamine (n=20)	7	35.0
GHB type substances (n=10)	5	50.0
Heroin (n=6)	3	50.0
Methadone (n=16)	3	18.8
Other opiates (morphine, codeine, homebake) (n=127)	52	40.9
Prescription stimulants (Ritalin, methylphenidate, dexamphetamine) (n=37)	2	5.4
Benzodiazepines (Valium, Serapax, Temazepam) (n=102)	40	39.2
BZP party pills (n=112)	32	28.6
BZP free party pills (n=55)	9	16.4

Table 7.2 presents the reasons people who use drugs who had decided **not** to drive under the influence gave for their decision. The most commonly reported reason for choosing not to drive under the influence was that people who use drugs felt their ability to drive was negatively affected. This was the most common reason reported for alcohol, cannabis, amphetamines/methamphetamines, LSD/hallucinogens, benzodiazepines, and BZP party pills. Being worried about the safety of others was the most common reason for avoiding driving under the influence of ecstasy (63.8%), while the reasons for not driving under the influence of other opiates was split between both these reasons (53.8% each). The numbers of drivers reporting avoiding driving under the influence of cocaine, Ketamine, GHB-type drugs, heroin, methadone, prescriptions stimulants and BZP-free party pills were too small to conduct meaningful analysis (see table 7.1).

Despite the risk of apprehension being identified as a key deterrent in the literature (Aitken, Kerger & Crofts, 2000; Jones, Donnelly, Swift & Weatherburn, 2006; McIntosh, O'Brien & McKeganey, 2008; Neale, 2001), it was not a primary reason for avoiding drug driving in the current study. This is likely due to a low perception of risk of apprehension, rather than a disregard for potential consequences of arrest. Being caught by police was more commonly reported as a reason for avoiding drink driving (58.3%), indicating that existing enforcement measures around alcohol might be influencing drinkers decisions to drive or not. It would be expected that fear of being caught drug driving by police might increase after enforcement initiatives start and publicity around drug testing is used to increase the perceived risks of apprehension. Asking this same question of people who use drugs who abstain from drug driving after drug testing begins could provide some insight into the effectiveness of the prevention programme.

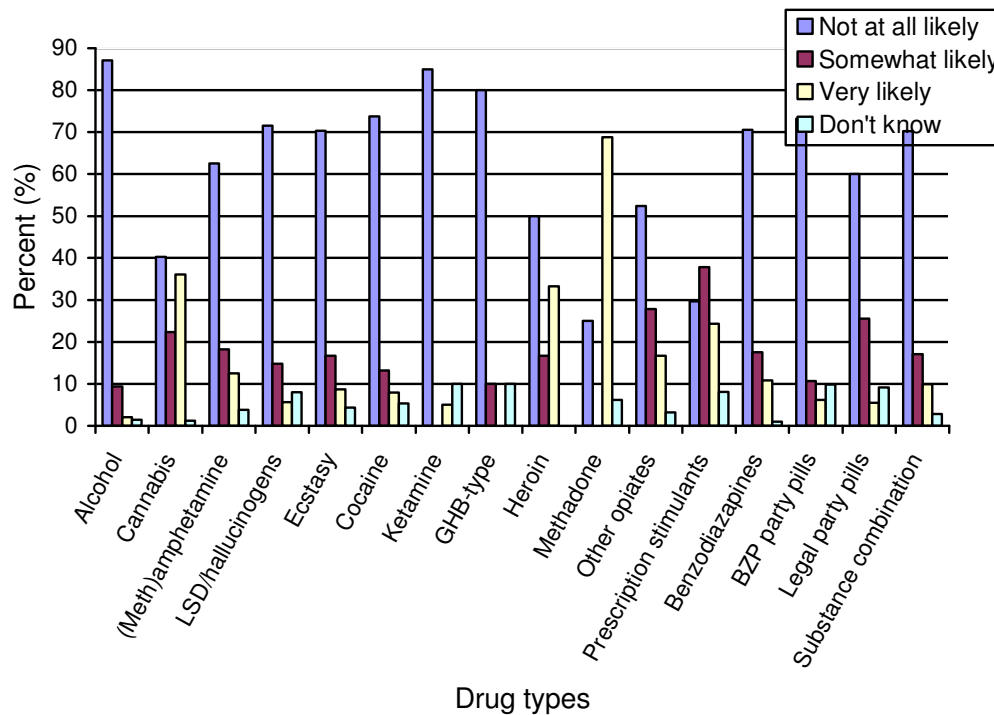
Table 7.2: Reasons for not driving following consumption of substances. (Respondents could select more than one option so percentages may not equal 100)

	Reasons for not driving following consumption of substances											
	My ability to drive was negatively affected		I was worried about getting caught by the police		People I was with convinced me not to drive		I was worried about safety of others		I was worried about my safety		Other reason/s	
	n	%	n	%	n	%	n	%	n	%	n	%
Alcohol	524	<b>64.5</b>	473	58.3	38	4.7	485	59.7	451	55.5	110	13.5
Cannabis	92	<b>58.2</b>	39	24.7	4	2.5	75	47.5	69	43.7	46	29.1
Amphetamines/ methamphetamines	12	<b>66.7</b>	5	27.8	1	5.6	8	44.4	6	33.3	7	38.9
LSD/ hallucinogens	36	<b>72.0</b>	6	12.0	3	6.0	25	50.0	24	48.0	13	26.0
Ecstasy	28	59.6	8	17.0	0	0.0	30	<b>63.8</b>	27	57.4	12	25.5
Other opiates (morphine, codeine, homebake)	28	<b>53.8</b>	4	7.7	3	5.8	28	<b>53.8</b>	27	51.9	14	26.9
Benzodiazepines (Valium, Serapax, Temazepam)	31	<b>77.5</b>	3	7.5	1	2.5	21	52.5	20	50.0	2	5.0
BZP party pills	19	<b>59.4</b>	5	15.6	2	6.3	12	37.5	12	37.5	12	37.5

Internet respondents who reported using substances were also asked “How likely is it that you will drive within three hours after using [substance] in the next 12 months?” Response options for this question were ‘not at all likely’, ‘somewhat likely’, ‘very likely’, and ‘don’t know’. Respondents were most likely to say it was ‘not at all likely’ that they would drive under the influence of all drugs except methadone and prescription stimulants. Sixty eight point eight percent of methadone users said they were ‘very likely’ to drive under the influence in the next 12 months. This reflects the nature of methadone use as part of a maintenance programme, where stabilised patients are tolerant to the impairing effects of the drug and are advised that they are safe to drive when methadone is used according to medical directions. Prescription stimulant users most commonly said they were ‘somewhat likely’ to drive under the influence in the next 12 months (37.8%). Like methadone, this too could be attributed to prescription user’s tolerance to the impairing effects when used according to medical directions.

Most cannabis users said they were ‘Very likely’ or ‘Somewhat likely’ to drive under the influence (58.5%). This is another reflection of the general acceptance of cannabis driving for some of this sample as evidenced in previous chapters. These cannabis users represent the target group for any future public education or awareness campaigns.

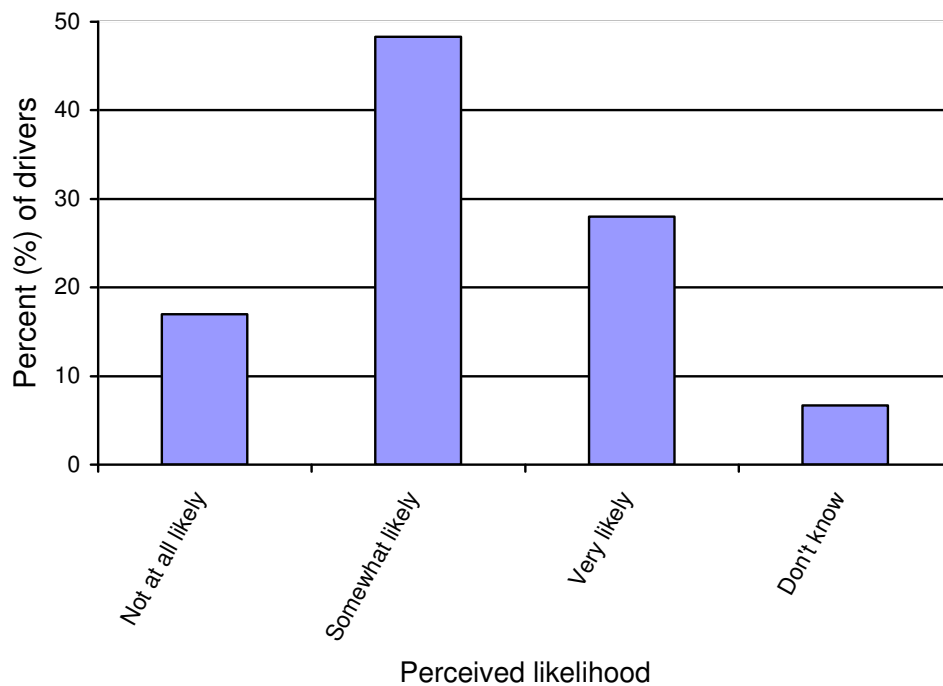
Figure 7.2: Perceived likelihood of driving under the influence of substances in the next 12 months for substance users



## Roadside testing

Internet respondent drivers (n=1124) were asked if they had been breath tested for alcohol in the previous 12 months, and whether they blew over their legal limit. Fifty eight point two percent of drivers had been breath tested for alcohol in the last 12 months, and 2.3 percent of these drivers blew over the legal limit on that occasion. Respondents were also asked how likely they thought it was that they would be breathalysed in the next 12 months. Figure 7.3 presents the proportions of respondents who reported their perceived likelihood of future breath testing. Respondents most commonly reported that it was 'Somewhat likely' that they would be breathalysed in the next 12 months (48.3%).

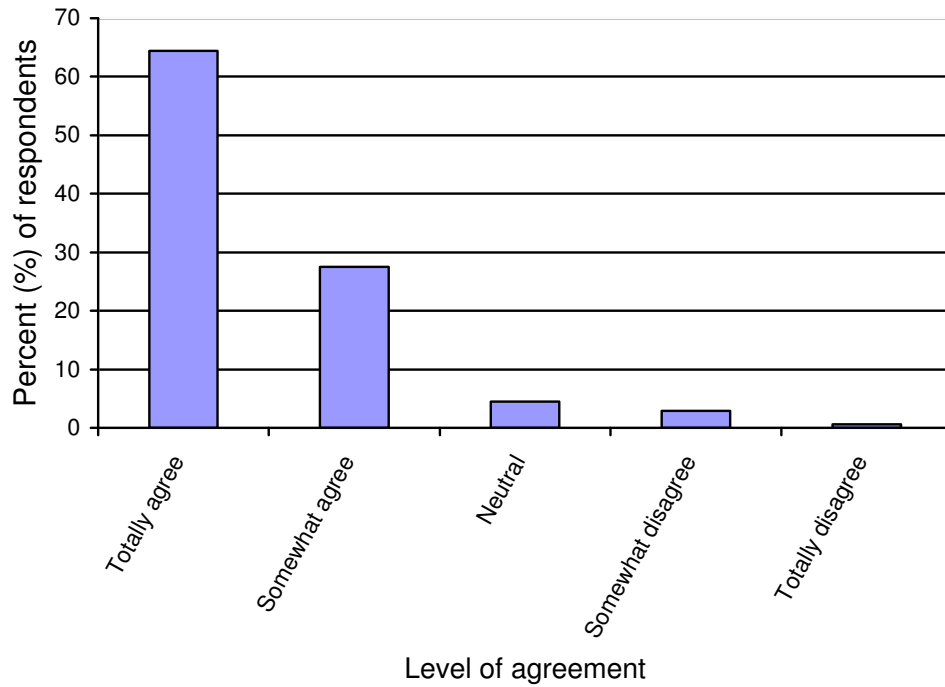
Figure 7.3: Perceived likelihood of being breath tested for alcohol in the next 12 months.



\*Global margin of error at 95% confidence interval is 2.9%

All internet respondents (n=1166) were asked whether they agreed with the statement that “Random breath testing (for alcohol) improves road safety”. The majority of respondents ‘totally agreed’ that random breath testing improves road safety (64.4%) indicating a general acceptance of the practice of stopping drivers and testing for alcohol impairment.

Figure 7.4: Level of agreement with the statement that “Random roadside breath testing (for alcohol) improves road safety”

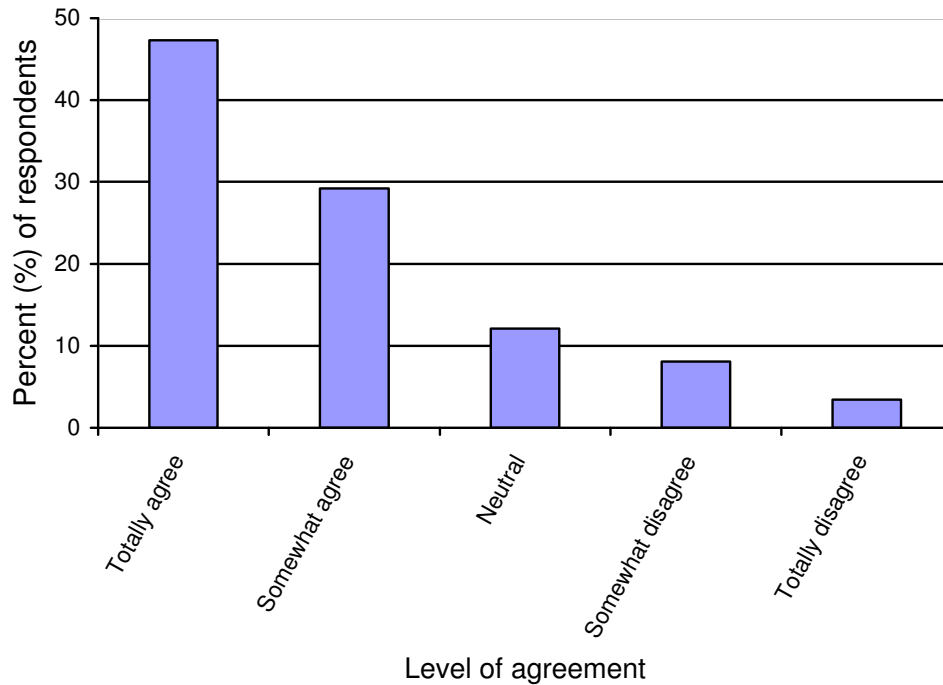


\*Global margin of error at 95% confidence interval is 2.9%



Internet respondents (n=1166) were then asked if they agreed with the statement that “Drug driving is a significant road safety issue in New Zealand”. Forty seven point three percent of respondents reported that they “totally agree” while 29.2 percent “somewhat agree” that drug driving is a significant road safety issue. There is a high level of acceptance in this sample that drug driving is a road safety concern. If the same level of understanding exists in the wider community, prevention initiatives may be more likely to be accepted and higher levels of inconvenience to individuals may be tolerated.

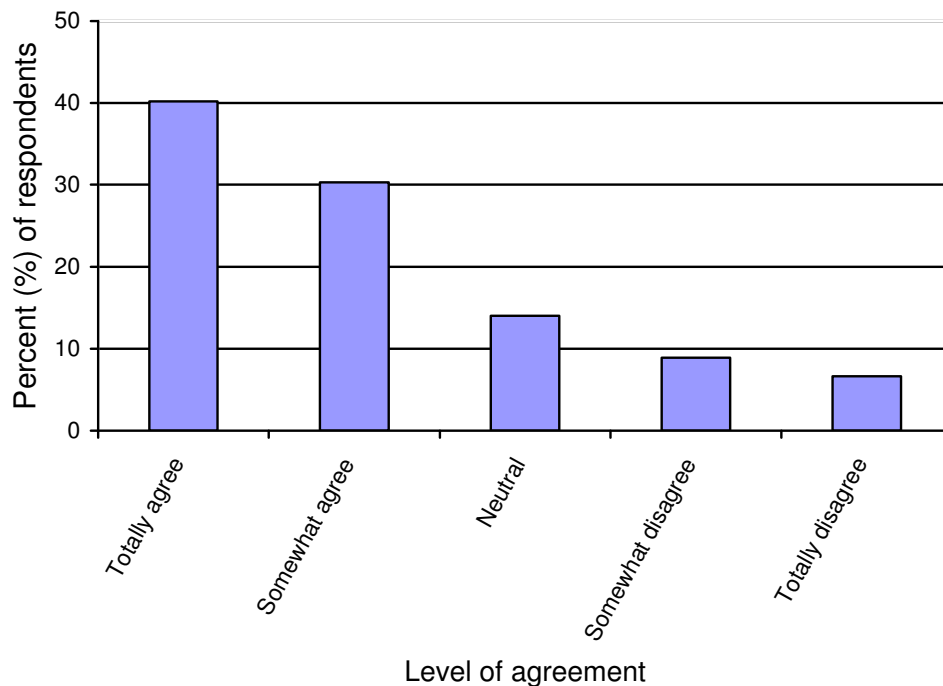
Figure 7.5: Level of agreement with the statement that “Drug driving is a significant road safety issue in New Zealand”



\*Global margin of error at 95% confidence interval is 2.9%

Finally, internet respondents (n=1166) were asked whether they agreed with the statement that “Random roadside drug testing would improve road safety in New Zealand”. Respondents were less agreeable to drug testing than they were to breath testing for alcohol. Forty point two percent ‘totally agreed’ and 30.3 percent ‘somewhat agreed’ that random drug testing would improve road safety. It is important to remember that respondents were answering this question in a vacuum of information. There has been no public education around proposed drug testing programmes so a level of caution could be expected. Respondents have more experience and greater knowledge around roadside breath testing for alcohol compared to drug testing. Respondents have no information of the process of drug testing, and may have concerns around the accuracy of drug tests. These concerns might be alleviated once public education campaigns are introduced. Overall respondents endorsed the idea of drug testing drivers, indicating that new enforcement initiatives are likely to be accepted by the general community.

Figure 7.6: Level of agreement with the statement that “Random roadside drug testing would improve road safety in New Zealand”



\*Global margin of error at 95% confidence interval is 2.9%

#### 7.4 Summary and discussion

Effective road safety countermeasures generally employ both enforcement and public education initiatives. The new enforcement measures introduced by the Land Transport Amendment Act 2009 provide a good starting point to begin to reduce driving under the influence of drugs in New Zealand.

In practice, the SFST or CIT will only be conducted if the driver first passes a breath alcohol test, so alcohol impairment is ruled out before drug impairment is considered. This means that a driver will usually only be charged with driving under the influence of a drug or alcohol, not both. Given the prevalence and increased risks associated with drug and alcohol combinations, it may be necessary to further develop the proposed legislation to allow identification of polydrug drivers. As reviewed in chapter five, relatively small amounts of alcohol combined with other substances, in particular cannabis, can cause severe driving impairment (Drummer et al., 2004; Kelly, Darke & Ross, 2004; Kerr & Hindmarch, 1998; Longo et al., 2000b; Movig et al., 2004; Ramaekers, Robbe & O'Hanlon, 2000; Robbe, 1998). A driver who is under the influence of cannabis alone might pose less risk to road safety than a driver who is under the legal BAC limit but is also positive for cannabis, however both drivers would be subject to the same penalty. A possible way to address this issue could be that when multiple substances are detected in the follow-up blood test, a prosecuting judge could take this into consideration in the same way that levels of alcohol are when sentencing drink drivers.

Limited amounts of research investigating the efficacy of the SFST have demonstrated that it is an imperfect test of impairment. When the SFST is used alone amphetamine impairment is unlikely to be detected, however the addition of tests for pupil size and responsiveness in New Zealand's CIT are likely to improve the reliability of impairment testing for amphetamines. THC impairment can be more reliably detected by the SFST or CIT, though it is at the cost of high rates of false positives. Ongoing research and evaluation of the SFST or CIT as part of New Zealand's drug driving enforcement programme will be necessary to ensure the cost of false positives (and false negatives) is reasonable to the community. The additional criteria of a Police officer requiring 'good cause to suspect' prior to impairment testing should improve the reliability of the testing programme as a whole.

Saliva testing could be considered a potential alternative to the SFST or CIT. The main advantage saliva testing offers is objectivity. However, there are several disadvantages associated with saliva testing, not least that saliva testing cannot determine whether a driver is impaired, and would effectively mean the implementation of a zero tolerance drug driving enforcement programme that may not be as effective in improving road safety. The system of sobriety testing being introduced into New Zealand will focus on impairment with the aim of improving road safety, without targeting unimpaired drug users. Saliva tests only detect the presence of a select number of drugs, where the CIT will detect impairment regardless of the drug responsible. The process of saliva testing raises concerns in relation to the New Zealand Bill of Rights Act. The requirement to provide a saliva sample without good cause to suspect that an offence has been committed may be considered 'unreasonable search and seizure', while the amount of time it takes to process test results (up to 20 minutes) may raise concerns about 'unjustified detention'. The accuracy of saliva test results is also currently unacceptable, with high rates of false positives and negatives making the tests unreliable. The CIT, in conjunction with the 'good cause to suspect' requirement and evidential blood testing is a more appropriate drug driving enforcement programme for New Zealand.

Key experts were largely in favour of reducing drug driving in New Zealand. Experts were more concerned with the resulting penalties than the testing process itself. A commonly raised issue was whether drivers would be provided with the opportunity to address their underlying drug problem when arrested for drug driving. Some key experts felt that

penalties for drug driving should include assessment and/or treatment for any addiction or dependence issues identified as a result of a drug driving arrest. The Land Transport Amendment Bill (No.4)<sup>6</sup> was described as a good starting point for drug driving enforcement. One expert discussed concerns over the need for an explicit drug risk schedule based on actual driving impairment rather than existing value judgments based around the Misuse of Drugs Act. Another key expert talked about the subjectivity of the SFST and the potential for profiling of vulnerable groups.

The media was reported as the primary source of information around drug driving for internet respondents. They also said they would prefer to get future drug driving information from the media. While this preference for information via the media is advantageous for mass media education campaigns, it also indicates a need to have a well informed media, able to report accurate and evidence based information to the public. This will be important if and when the new drug testing programme is implemented.

Other preferences for future sources of drug driving (excluding alcohol) information were the internet and pamphlets. Both these sources of information require no person to person interaction. It is likely that the illegal nature of many drugs means that users and non-users alike would prefer to get their drug driving information anonymously.

People who use drugs who had on occasion decided not to drive under the influence in the past 12 months were primarily concerned that their ability to drive was negatively effected by drugs. Education campaigns could highlight the negative effects of drugs on driving ability to increase this pattern of decision making. Interestingly, being caught by police was not a primary reason for avoiding drug driving, despite findings in other research literature. This may be because the perceived risk of being detected driving under the influence of drugs is currently so low that it fails to be a concern to drug drivers. Detection was more of a concern for drinkers, indicating that the increased risk of apprehension influenced decision making. Increasing the perceived risk of detection for drug driving will likely lead to fear of apprehension becoming a more common reason for avoiding driving under the influence.

Substance users reported that they were unlikely to drive under the influence of most drugs in the next 12 months. Methadone users and prescription stimulant users were the exception reporting that they were 'very likely' and 'somewhat likely' to drive under the influence in the next 12 months. The nature of both these substances means that when used as prescribed, stabilised patients become tolerant to the impairing effects of the drugs and medical advice is that driving is safe. Cannabis users were somewhat split over whether they would drive under the influence or not with similar proportions saying it was 'not at all likely' and 'very likely'. This split between cannabis users who do and do not anticipate driving under the influence reflects a division in attitudes and behaviour among the cannabis users in this sample. A similar division was apparent for risk perception, where cannabis users who did not drive under the influence perceived drug driving to be more dangerous than those who had driven under the influence. There may be a core group of cannabis users who drive under the influence, do not perceive any risk of driving under the influence, and who do not intend to avoid driving under the influence. This group represents the drug drivers who should be specifically targeted by both enforcement and education or awareness campaigns.

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<sup>6</sup> Now known as the Land Transport Amendment Act 2009

The majority of internet respondents had been breath tested for alcohol in the previous 12 months and only a small proportion of those had blown over the legal BAC limit. The majority also thought it was 'somewhat likely' or 'very likely' that they would be breath tested for alcohol in the next 12 months, and roadside testing for alcohol was well supported. Most respondents agreed that drug driving was a significant road safety issue in New Zealand, though there was less support for roadside testing for drugs than there was for alcohol. This may be because respondents have very little knowledge of what roadside testing for drug impairment might involve compared to breath testing for alcohol. Education and awareness campaigns could include information about the drug testing process in order gain wider support for potential enforcement programmes. Working with the media to disseminate information about the road side drug testing programme before it begins could also be beneficial.

## **8. Discussion**

Drug driving has been a growing concern in New Zealand culminating in the introduction of the Land Transport Amendment Bill (No.4)<sup>7</sup> to parliament in 2007. The proposed legislation intends to reduce drug driving by strengthening enforcement. Much international research has demonstrated that driving under the influence of drugs is a road safety concern, however little research has been done in New Zealand to assess the level of the drug driving problem on our roads. The prevalence of drug driving in the general driver population is yet to be thoroughly investigated, and drug driving among drug user groups should also be examined. Community attitudes and knowledge around drug driving and feelings around roadside testing for drug impairment also need to be better understood. The current research aimed to begin to fill gaps in local research evidence around these issues. The review of international research literature provides insight into what is already understood about drug driving and how it might apply to the New Zealand context. Key experts working in New Zealand in industries relating to drug use, education, driving and health were interviewed to gain a 'coal face' perspective of the issue. The internet survey gathered data on drug driving attitudes and behaviours of a considerable sample of New Zealanders. Together this information can guide the development of countermeasures to reduce drug driving on New Zealand roads. This final chapter of the report will summarise key findings from these studies and their potential implications.

### **8.1 Limitations of current research**

There are several limitations of the current research. The literature review aimed to provide an overview of what is already understood about drug driving from international research. The conclusions drawn from the literature are based on the available evidence, but should only be considered an indication of what we know so far. There are many areas of drug driving yet to be thoroughly examined, and new developments emerge as we learn more about ways of preventing drug driving. The literature review provides a good background to issues examined in key expert interviews and the internet survey, but should not be considered a complete picture of the drug driving issue.

Key experts were selected based on their involvement in organisations where drug driving might be a relevant issue. A wide variety of experts were selected and invited to be

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<sup>7</sup> Now known as the Land Transport Amendment Act 2009

involved, with most accepting and participating in an interview. A small number chose not to participate. The sample of key experts should not be interpreted as a representative sample of expert opinion. Likewise, key experts provided *personal and professional opinion* around the drug driving issue only, and their statements should not be considered evidence of any drug driving related issue. It would be unreasonable to use expert opinion from this research as the basis of any policy or practice around drug driving.

The results from the internet survey should also be interpreted within the context of the limitations of the survey methodology. A survey such as this is susceptible to sampling biases for several reasons. Only those who are aware of the internet survey are able to choose to participate, certain people may have had more interest or motivation to participate in the study (e.g. people who use drugs), and only people with access to the internet could complete the survey.

Like any voluntary survey study the sample was self-selecting, resulting in the over-representation of respondents from various demographic groups. Compared to the New Zealand general population, the sample was relatively well educated, well employed, with an over-representation of Pakeha, females, and city dwellers in Auckland and Wellington. Over a third of the sample (35.6%) worked in health or government departments. People who use drugs were also over-represented in the sample, however this allowed for more robust statistical analysis of drug users' driving behaviours and attitudes. The over-representation of people who use drugs means that the prevalence of drug driving within the entire sample is likely to be higher than that of the general population. For these reasons, **the internet sample should not be considered representative of the New Zealand general population, and therefore are not indicative of drug driving on New Zealand roads.**

An issue that limited the size of the internet survey sample was the length to the survey. The sample size decreased from 1450 to 1166 after screening, largely due to incomplete data. The survey took up to 20 minutes to complete, and despite being informed of the survey's length prior to starting, many participants quit mid way through the survey, likely due to the repetitive nature of questions about each substance and driving. More advanced software is available that shortens the survey by screening out unnecessary questions for each participant; however the cost was prohibitive for the current project.

Another limitation for the internet survey centers on respondents' interpretations of terms used in survey questions, such as 'under the influence' or 'drug driving'. Like much drug driving research, it was not possible to define 'under the influence' as the term depends on variables such as dose, individual factors, and time between use and driving. When the terms 'under the influence' or 'drug driving' were used in the survey it was left up to each respondent to interpret what that meant. This may have resulted in variations in responding due to different interpretations of the questions. Where possible the use of these terms were avoided and most questions asked about driving 'within three hours of use' of substances.

A final limitation of the internet survey is the different ways in which respondents were asked if they had driven under the influence of alcohol and other drugs. For alcohol, respondents were asked whether they had driven while they felt they were over the legal limit allowed to drive. For other drugs, respondents were asked whether they had driven within three hours of use. It is possible that there were qualitative differences between

these two forms of question, and reported rates of drink driving and drug driving may not be directly comparable. However, both questions were intended to tap into driving while impaired by each substance, and it is likely that respondents interpreted these questions as such with the understanding that the purpose of the survey was to examine drug driving. Further, the 'within three hours of using' criterion has been used previously, and has been established as a suitable timeframe to capture the majority of impairment for the drugs surveyed (Mallick et al., 2007). It is acknowledged that a driver might be impaired while under the legal BAC limit, however this is the limit that society has chosen as acceptable for driving, and was therefore the appropriate indicator of impairment for the current study. These differences in measurement of impairment between alcohol and other drugs should be born in mind when interpreting the results of the internet survey.

The following section summarises the key findings and their implications for the development of prevention programmes or future research. These will be presented by chapter.

## 8.2 Prevalence

### Key findings

1. The substance most commonly driven under the influence of is cannabis:
  - Drug users were overrepresented in the internet survey sample, meaning that rates of drug driving in this study should not be generalised to the general driver population of New Zealand.
  - Nearly a quarter (24.5%) of driver respondents reported driving under the influence of cannabis in the previous 12 months
  - Driving under the influence of cannabis (24.5%) was reported more often than drink driving (21.4%) (global margin of error at 95% confidence interval was 2.9%).
  - Polydrug driving was also reported by 11.6 percent, and cannabis and alcohol combinations were most common (51.5%). Polydrug combinations always involved alcohol.
2. Driving under the influence of drugs is relatively common among drug user groups:
  - Considering the prevalence of drug driving in countries like Australia, paired with New Zealand's rates of drug use in the general population and the small amount of local evidence available, there is likely to be a small but significant number of road users driving under the influence of drugs in New Zealand
  - Alcohol users were least likely to drive under the influence (23.6%)
  - Driving under the influence of drugs was relatively common among people who use drugs in the sample, and was reported by 87.5 percent of methadone users, 70.3 percent of prescription stimulant users and 67.1

percent of cannabis users. These respondents were more likely to drive within three hours of drug use. Cannabis driving is of primary concern as there is both a high rate of use and a high rate of driving under the influence. (Small numbers of methadone and prescription stimulant users in the sample mean these prevalence rates should be interpreted with caution).

3. Drug drivers tended to be characteristically different from people who use drugs that did not drive under the influence:
  - Drug drivers tended to be male. Males were significantly more likely to drive under the influence of alcohol, cannabis, and drug combinations.
  - People who use drugs who reported driving under the influence tended to be younger than people who use drugs who did not, though the difference was only significant for alcohol. Methadone users who drove under the influence were significantly older than those who did not.
  - Drug drivers tended to use drugs more frequently than people who use drugs who did not report driving under the influence. This might be an indication that people who use drugs with dependence issues are more likely to drive after drug use.

### **Implications**

1. Drug driving was relatively prevalent among people who use drugs in the sample, indicating drug driving is likely to be a road safety issue in New Zealand. Prevention initiatives to reduce drug driving appear to be justified and necessary.
2. More research is required to gain an accurate assessment of drug driving prevalence in New Zealand. General driver population data from random roadside testing, crash injury data and fatality data from New Zealand research will provide a more complete picture of drug driving prevalence in New Zealand.
3. Cannabis use is prevalent in the New Zealand general population (Wilkins & Sweetsur, 2008) and in the current study cannabis was the drug most commonly driven under the influence of, indicating that cannabis driving should be a priority area for both enforcement and public education, as well as treatment initiatives.
4. Driving under the influence of alcohol and other drug combinations was also relatively common and is high risk behaviour due to increased impairment. This should also be a priority area for enforcement and public education initiatives.
5. As more frequent drug use is correlated with increased likelihood of drug driving, the dependence issues of some drug drivers should be acknowledged and addressed by any future prevention initiatives.

### **8.3 Impairment**

#### **Key findings**



1. International research has demonstrated that drugs cause driving impairment and that driving while under the influence of drugs is a threat to road safety:
  - While there is conflicting evidence around the nature and extent of the impairing effects of some drugs, there is increasing evidence to suggest that driving under the influence of drug combinations, alcohol along with cannabis, and benzodiazepines pose significant risks to road safety.
2. Drug drivers' perceptions the last time they drove under the influence were generally of minimal impairment, but varied depending on the substance used:
  - All polydrug drivers reported that their driving was 'a lot worse' the last time they drove under the influence of a drug combination.
  - Overall the majority of drug drivers perceived that their driving was not affected or only slightly worse for all the other substances.

### **Implications**

1. Awareness of drug driving impairment for those engaged in the behaviour is low. This presents a challenge for drug driving education campaigns, as messages that are not consistent with the target audience's experiences have the potential to be dismissed by them as incorrect.
2. Further research into the experiences of drug drivers and the reasons for their perceptions of impairment could provide valuable information for use in the development of education campaigns that could be more likely to be accepted by the target audience.

## **8.4 Risk perception, knowledge and understanding of drug driving**

### **Key findings**

1. Attitudes toward drug driving appear to predict drug driving behaviour:
  - Previous research has found that the more harm or risk an individual perceives around drug driving the less likely they are to engage in the drug driving behaviour, and vice versa.
  - Attitudes were related to drug driving behaviour for internet survey respondents. People who use drugs who had driven under the influence of drugs perceived the risks of drug driving to be lower than drug users who had not driven under the influence.
2. All drugs were perceived to be dangerous when driving under the influence, though some were perceived to be safer than others:
  - Cannabis was perceived to be the least dangerous drug for driving under the influence, while alcohol was perceived to be most dangerous.
3. There was a general lack of knowledge around the effects of drugs on driving:

- Respondents reported knowing ‘nothing’ or ‘very little’ about the effects of most substances on driving ability.
- Substances for which respondents felt they knew the most were alcohol and cannabis. The sources of this information are likely to be different. Alcohol knowledge might be gained via road safety education campaigns, where cannabis knowledge might be gained from personal experiences and exposure to use in the community.
- With the exception of alcohol, most internet respondents reported that they ‘didn’t know’ how long a driver should wait after drug taking before ‘safe’ driving was possible.

### **Implications**

1. The literature demonstrates that public education campaigns around drug driving should highlight the risks of apprehension over the risks to personal safety. The actual risk of apprehension also needs to increase for the education campaign to be effective. The introduction of roadside drug testing in New Zealand and the publicity around it should encourage an increase in the perceived risks of apprehension. In the current research people who use drugs were primarily influenced not to drive by their perceived driving impairment. Risk of apprehension is likely to become a more powerful deterrent as the actual risk of being caught drug driving increases.
2. Understanding the differences in perceptions of risk for people who use drugs who do and do not drive under the influence could be key to the development of messages for prevention campaigns. Further research should investigate why some people who use drugs choose to drive under the influence while others do not.
3. Driving under the influence of cannabis is again highlighted as a potential priority for prevention initiatives. While the literature shows that cannabis is an impairing substance, internet respondents perceived it to be the least dangerous drug for driving under the influence. They also reported being knowledgeable about cannabis relative to other drugs. This indicates a level of misinformation around cannabis and driving which should be targeted as a priority in any future countermeasures.

## **8.5 Countermeasures**

### **Key findings**

1. According to the research literature the most effective drug driving prevention initiatives include both enforcement and public education aspects:
  - Increasing the perceived risk of apprehension while simultaneously increasing the actual risk of apprehension is the most effective deterrent for drug drivers.

- New Zealand is in the process of introducing legislation that will increase the actual risk of drug driving apprehension, while the associated publicity should increase the perceived risk of apprehension for drug drivers.
  - Internet respondents who had used drugs reported that the last time they made the decision not to drive under the influence, the primary reason was that they felt their driving ability was negatively affected. Being apprehended by police was not a major concern.
2. There is a dearth of evidence around the efficacy or the SFST for drug impairment:
- Limited research evidence has reported that the SFST generates high rates of false positives for THC impairment, and is unable to identify drivers under the influence of amphetamines. However the New Zealand drug driving enforcement programme employs the added requirement of ‘good cause to suspect’ drug impairment prior to impairment testing, providing another layer protection against misidentification of impairment. Further, the addition of tests for pupil size and responsiveness in New Zealand’s CIT may improve the efficacy of the impairment test.
  - An alternative to the SFST is saliva testing, which is used extensively in Australia. Saliva testing is also an imperfect measure; it offers the advantage of greater objectivity, but cannot indicate whether a driver is impaired by a substance or not, is currently too unreliable to be employed for roadside testing, can only detect a select group of substances, and would breach the New Zealand Bill of Rights Act on the grounds of ‘unreasonable search and seizure’ and ‘unjustified detention’.
3. Internet respondents reported getting their knowledge of drug driving from a variety of sources and preferred to get future information from impersonal sources:
- The media, friends and personal experience most often provided respondents with their drug driving information in the past.
  - Respondents preferred to get future information about drugs and driving from sources that did not require person to person interaction, such as the media, the internet, or pamphlets.
4. Road side testing is seen as an effective method of improving road safety:
- The profile of breath alcohol testing was relatively high among internet respondents with the majority reporting that it was ‘somewhat likely’ or ‘very likely’ they would be breath tested in the next 12 months. Respondents also expressed support for roadside breath alcohol testing with the majority ‘totally agreeing’ or ‘somewhat agreeing’ that it improves road safety.
  - The majority of internet respondents reported that they ‘totally agreed’ or ‘somewhat agreed’ that drug driving was a significant road safety issue in

New Zealand. The majority also 'totally agreed' or 'somewhat agreed' that roadside drug testing would improve road safety.

## Implications

1. Drug driving prevention initiatives should focus on increasing both the perceived and actual risks of apprehension for drug drivers. People who use drugs who reported deciding not to drive under the influence were not concerned about being caught by police. There may be a sub-group of drug drivers who would also decide not to drive under the influence if they felt the risks of apprehension were higher.
2. Further research on the CIT is essential. Ongoing assessment of the proposed new enforcement programme should evaluate rates of false positives and its impact on the community to ensure the CIT is an adequate tool for the purpose. If large numbers of drivers suspected of impairment after a CIT are later cleared by blood test, use of the CIT should be re-evaluated.
3. Those responsible for drug driving enforcement should monitor the development of saliva testing technology. This objective measure of drug presence might be useful for New Zealand drug driving enforcement once advancements in accuracy, cost and speed of processing have been made. However the costs and benefits of a zero tolerance, rather than impairment focused, enforcement programme will need to be given serious consideration. And whether or not saliva testing can be accommodated under the New Zealand Bill of Rights Act is also an important issue.
4. Internet respondents' preference for impersonal sources of drug driving information is likely due to the illegal nature of many drugs. Public education campaigns should focus on these impersonal media so that drivers can access drug driving information anonymously. Drug-using populations will need to be targeted specifically. The information contained in an education campaign needs to be realistic and in line with best evidence in order for people who use drugs to take the messages seriously. They should focus on drug driving as the risk behaviour and avoid conveying messages of judgment of drug use in general. Any public education campaign should be evaluated to ensure its effectiveness.
5. If internet respondents' support for roadside testing is reflected in the general community then the introduction of roadside testing for drug impairment should be acceptable to the public of New Zealand. Ongoing support for the testing programme will depend on the efficacy of the testing process. If the CIT proves to be unreliable and significant numbers of unimpaired drivers are inconvenienced by blood tests and having their cars impounded, the programme will not be tolerated by the community, and its effectiveness will be undermined. However, there will be no random roadside testing using the CIT, and drivers will only be subject to impairment testing if an officer has 'good cause to suspect' impairment based on observed driver behaviour. This should act as an additional screening process, so that only drivers with obvious signs of impairment undergo the CIT. Ongoing evaluation of the enforcement programme will be essential.



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