

Drugs and Driving in Australia

A survey of
community
attitudes,
experience and
understanding



IN PARTNERSHIP WITH



Turning Point
Alcohol & Drug Centre

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Drugs and driving in Australia:

A survey of community attitudes, experience and understanding

Jane Mallick¹, Jennifer Johnston², Netzach Goren¹ and Vanessa Kennedy¹

¹ Australian Drug Foundation

²Turning Point Alcohol & Drug Centre

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As a leading Australian insurer providing car, home and compulsory third party personal injury insurance, AAMI has along tradition of supporting organisations and initiatives that contribute to improving the safety of our community and the wellbeing of our customers.

AAMI contributes to the community via a range of key sponsorships and investment in a range of not-for-profit activities in sporting, cultural and community arenas. These include:

- Partnership with the National Trauma Research Institute
- Principal sponsorship of the Victoria State Emergency Service
- Sponsorship of New South Wales Fire Brigade
- Establishment of the Skilled Drivers program, which is designed to encourage safe driving behaviour among young drivers

In addition to these organisations, AAMI also supports innovative research projects that inform and educate the community about road safety issues. For 13 years, we have released the AAMI Crash Index, a report based on an independent survey of more than 2000 drivers, that explores their attitudes to potential driving issues such as speed, fatigue, traffic congestion and alcohol.

AAMI's strong sense of community and dedication to significant, credible road safety research paved the way for the development of a partnership with the Australian Drug Foundation (ADF). This partnership commenced in 2006, when AAMI agreed to financially support an extensive research project that would explore the issue of drug-driving, and the wider community's attitude and experience with respect to the issue.

As community awareness of the issue of drug driving continues to grow, it is the hope of both the ADF and AAMI that this innovative research will contribute to public and policy debate about drugs and driving in Australia, in a credible and informed way.

A handwritten signature in black ink that reads "M. J. Kay". The signature is written in a cursive, flowing style.

Michael Kay
AAMI



We live in a drug-taking society. Most people use alcohol and pharmaceuticals, and some use tobacco. We know these legal drugs can cause significant harms. In the case of alcohol the link to impaired driving and its consequences are well established.

A significant proportion of the Australian population has tried an illicit drug—some use these substances on a regular basis. Their impact on driving is becoming more and more problematic; however, we still have a lot to learn about their impact. But any successful initiative to reduce the harms that may flow from drug-impaired driving will rely to a large degree on drivers themselves understanding the issues. The research reported here tells us that levels of knowledge in this emerging domain are poor, and that attitudes to drugs and driving are not necessarily conducive to safety.

The Australian Drug Foundation acknowledges the leadership and support of AAMI in trying to understand these issues better. Together with our research partner, Turning Point Alcohol and Drug Centre, this report is a major step in gaining that understanding. It raises some obvious issues and highlights some unexpected challenges. The impact of some pharmaceuticals on driving behaviour has long been known but is clearly an issue that cannot be ignored any longer. Drugs and Driving in Australia offers some clear directions for future strategies. While cessation of any drug use in our community may be desirable it is also totally unrealistic. Against this background we are keen to work together with a range of stakeholders to establish policies and practices that will reduce the harm from driving if, and when, drugs are being used.

Bill Stronach
Chief Executive Officer, Australian Drug Foundation

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Executive Summary

Background

Australian efforts to increase road safety, such as initiatives targeting drink driving, speeding and the use of seat belts, have seen considerable reductions in road trauma in the past 30 years. There is recent evidence to suggest that drugs other than alcohol, both licit (for example, pharmaceutical drugs) and illicit (for example, cannabis, methamphetamines and ecstasy) are associated with impaired driving ability and, thus, road trauma.

There remain, however, many questions regarding drug driving in Australia. For instance, little is known about the prevalence of drug driving within the general population, or about the attitudes and perceptions of drivers in relation to drug driving. Such information is important to inform the development of effective prevention and road safety countermeasures. Further, although much of the previous research, policy and media attention have focused on illicit drugs, there is increasing evidence that pharmaceutical drugs impair driving ability and thus may be a road safety concern. There is, however, little information regarding the prevalence of driving following pharmaceutical drug use and the community's attitudes and perceptions towards the use of such drugs and driving.

It was the aim of this research to address some of the gaps in the knowledge by exploring the Australian community's attitudes, experience and understanding of drugs and driving, in relation to alcohol, illicit drugs and pharmaceutical drugs. The ultimate aim was to inform the development of effective policy, and information and education campaigns, targeting drug driving.

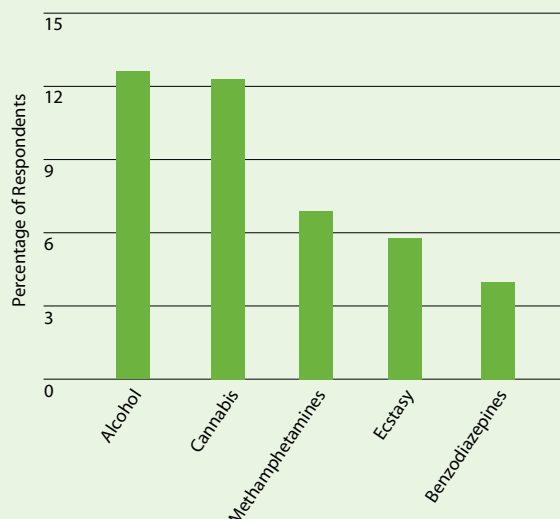
The research consisted of three stages: a review of the literature regarding drug driving; in-depth interviews with 20 key stakeholders from the Australian drug and alcohol and/or road safety sectors; and an Internet survey of Australian drivers (N=6801). The focus of the

data collected from these three sources was on the prevalence of drug driving in Australia; the driving impairment associated with drug use; the attitudes and perceptions of drivers towards drugs and driving; and the road safety countermeasures adopted to address drugs and driving.

Key findings

One of the main aims of the study was to provide an estimate of the incidence of drug driving on Australian roads. Participants in the Internet survey were asked whether they had driven in the previous 12 months within three hours of using a range of drugs or, in the case of alcohol, with a blood alcohol concentration (BAC) over .05. As presented in Figure ES1, comparable proportions of the total sample reported driving with a BAC over .05 (12.6 per cent) and within three hours of cannabis use (12.3 per cent) in the previous 12 months. It is important to note that the Internet sample reported higher levels of drug use in the past 12 months when compared to

Figure ES1: Drug driving reported by Internet respondents (N=6801)



typical estimates of drug use in the general population. This suggests that the findings may be an over estimate of drug driving within the general population.

Previous research has indicated high levels of drug driving within drug-using populations. Thus, it was also of interest to examine the incidence of drug-driving behaviours within the sub-groups of drug users in the Internet sample. As presented in Figure ES2, over half of the respondents who reported having used cannabis (51.3 per cent) and methamphetamines (52.7 per cent) in the previous 12 months, also reported that they had driven within three hours of drug use during this period of time.

Previous research has suggested that drug users are less likely to perceive driving under the influence of drugs to be risky than non-drug users. Figure ES3 presents a comparison of the perceptions of risk for drug users versus non-drug users from the Internet sample. Although driving under the influence of alcohol is generally considered to be risky by both drinkers and non-drinkers, there were considerable differences in the risk perceptions of cannabis, methamphetamine, ecstasy

and benzodiazepine users and those who had not used these drugs, whereby users perceived significantly less of a risk than non-users.

One of the aims of the research was to examine the levels of knowledge of Australian drivers in relation to drugs and driving. Figure ES4 presents the findings in relation to Internet respondents' levels of knowledge regarding the influence of alcohol, cannabis, methamphetamines, ecstasy and benzodiazepines on driving ability. Although respondents reported being well informed about the effect of alcohol on driving ability, and some reported knowing something about cannabis and driving, they were considerably less informed about methamphetamines, ecstasy and benzodiazepines.

It was of interest to explore the attitudes of the Internet sample towards law enforcement countermeasures targeting drink driving and drug driving—specifically, random breath testing (RBT) and roadside drug testing (RDT). Figure ES5 presents the reports of participants regarding their level of agreement with statements that the testing methods improve road safety.

Figure ES2: Drug driving reported by drug users

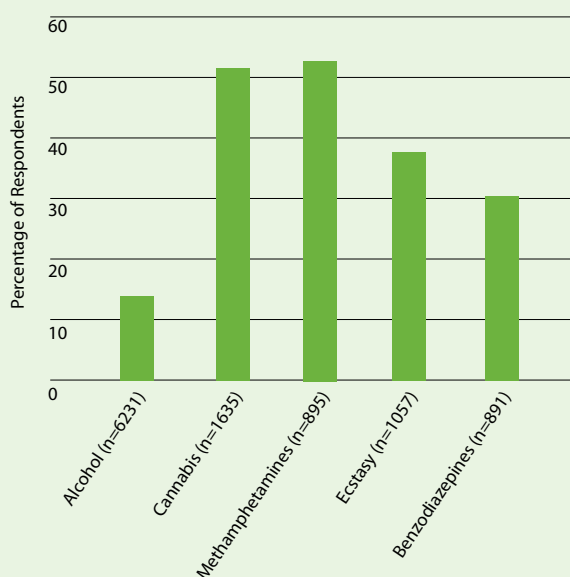
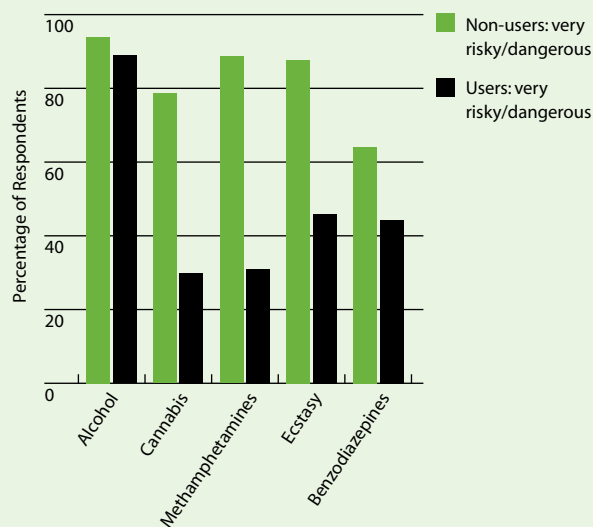


Figure ES3: Proportion of non-users and users who perceived driving under the influence of specific drugs to be very risky/dangerous



Summary of findings, implications and conclusions

Alcohol

1. Alcohol remains the drug of most concern in relation to road safety. In the current climate of an increased focus on drugs other than alcohol, it is important that the attention and resources are not diverted from alcohol.
2. Driving under the influence of alcohol is generally perceived as very risky or dangerous, and there is widespread recognition of the impairing effect of alcohol on driving ability. This suggests that alcohol-related countermeasures have been effective.
3. There remains, however, a number of sub-groups of drivers who continue to drink drive. For example, driving under the influence of alcohol is more common among males, younger drinkers and frequent drinkers. Countermeasures specifically targeting these groups, including information and education, as well as deterrence and law enforcement

strategies, need to be developed, implemented and evaluated. In addition, more research is required to examine the attitudes and behaviours of those who drive under the influence of alcohol despite being aware of the impairing effect of alcohol on their ability to drive, those who perceive no change in their driving ability despite being under the influence of alcohol and those who consider that being under the influence of alcohol improves their driving ability, to inform the development of countermeasures that target these drivers.

4. RBT has widespread community support, is perceived as a strategy that has improved road safety and has been an effective component of reducing drink driving in Australia. RBT should continue to be widely implemented and publicised.

Illicit drugs

1. Although little is known about the prevalence and nature of drug driving, the current findings suggest that considerable proportions of Australian drivers have driven within three hours of using an illicit drug.

Figure ES4: Levels of knowledge on the effect drugs have on driving ability, of total Internet sample (N=6801)

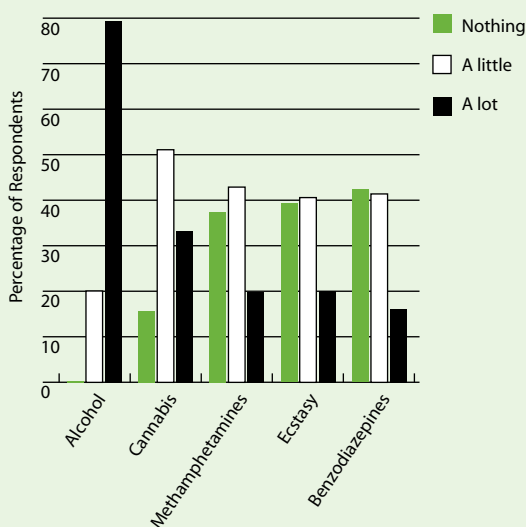
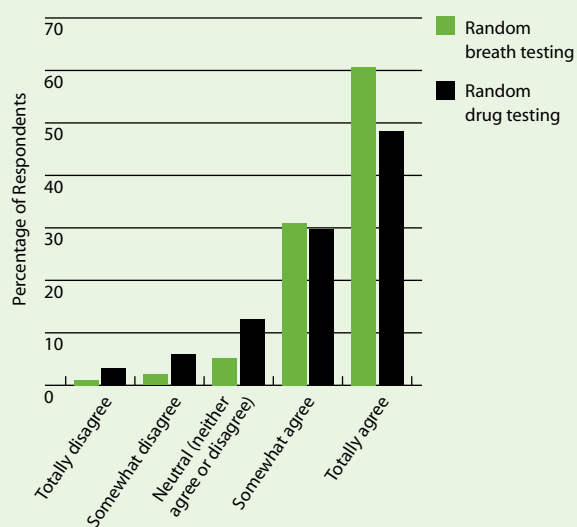


Figure ES5: Level of agreement with the statement that RBT (n=6771) and RDT (n=6781) improve road safety



- Cannabis, methamphetamines and ecstasy appear to be the drugs of most concern from a road safety perspective. Further research needs to be conducted to determine the extent and nature of drug driving on Australian roads.
2. Although the limited research conducted to date has produced mixed findings, there is increasing evidence that illicit drugs impair driving ability and that driving while under the influence of illicit drugs poses a risk to road safety. Further research needs to be conducted into the impairment associated with the use of a range of illicit drugs on driving ability.
 3. Driving under the influence of illicit drugs is perceived by the general population as very risky or dangerous. Illicit drug users perceive there to be less risk than non-users. Thus, more detailed information, based on reliable, accurate and the best available scientific evidence, needs to be disseminated to specific drug-using populations regarding the impairment to driving ability associated with illicit drugs. Initiatives targeting drug-using groups need to acknowledge the drug users' experiences and perceptions, and therefore, adopt a harm-minimisation approach, with a focus on preventing drug-impaired driving.
 4. The Australian community is not well informed about the impact of illicit drugs on driving ability. To date, few education and information initiatives regarding illicit drug use and driving have been undertaken in Australia. There is a clear need for these to be undertaken in the future, through both mass media campaigns and more targeted methods, such as including illicit drug use as part of driver and school-based education, as well as information dissemination via general practitioners and other health professionals.
 5. There is a clear need to provide targeted education and information to drug-using groups. This would require a coordinated dissemination strategy through a range of appropriate settings and methods, such as the Internet, peer education and convenience advertising at venues, as well as leaflets and pamphlets distributed through health and other settings.
 6. The media is one of the main sources of drug-driving information for the general community. Therefore, it is necessary to engage and educate the media around these complex issues to promote the accurate dissemination of information.
 7. Although RDT has either relatively recently, or is soon to be, implemented in most Australian jurisdictions, there are some concerns regarding the accuracy and deterrence value. It is crucial that independent evaluations into RDT are undertaken regarding the accuracy of testing procedures, the effectiveness of this strategy in reducing the number of impaired drivers on the road and the cost-effectiveness of RDT.

Pharmaceutical drugs

1. There is increasing evidence that some pharmaceutical drugs, benzodiazepines in particular, are implicated in a considerable proportion of road accidents and trauma and are, thus, a concern from a road-safety perspective. Further research should be conducted to determine the extent and nature of pharmaceutical drug driving on Australian roads.
2. Pharmaceutical drugs are generally perceived to have less of an impairing effect on driving ability than alcohol and illicit drugs, and there is considerable variability regarding perceptions of risk associated with pharmaceutical drugs and driving, with users perceiving less risk than non-users. Of the pharmaceutical drugs examined in this research, benzodiazepines were considered a greater risk to road safety than either prescription stimulants or analgesics.
3. Much of the information regarding pharmaceutical drugs and driving is provided to users at the point of dispensing, through warning labels on packaging, Consumer Medicines Information (CMIs) and verbal information provided by pharmacists and doctors. However, it is unclear how consistently such information is provided and/or adhered to.
4. It is crucial that further research is conducted to ascertain reliable and accurate data as to the impairing effects of pharmaceutical drugs, and

the findings of such research is used to inform the development of education and information evidence-based countermeasures regarding pharmaceutical drugs and driving.

5. There are a number of complicating factors that need to be considered when addressing pharmaceutical drugs and driving. First, there are many different types of pharmaceutical drugs and doses on the market, with differing degrees of impact on road safety. Second, when taken according to prescription, pharmaceutical drugs can have medicinal benefits that lead to improved (rather than impaired) driving ability. Finally, once a patient's medicine is stabilised (that is, a tolerance is developed), the degree of impairment can in effect reduce (compared to the initial stages of use).
6. The main law enforcement strategy targeting pharmaceutical drug driving is sobriety testing. Evidence suggests that sobriety testing is an effective means of getting impaired drivers off the road. The deterrent effect of sobriety testing, however, is limited, given the low profile of its implementation. There needs to be a multifaceted approach to pharmaceutical drugs and driving, including: mass media messages about all drug-impaired driving, targeted information and education for pharmaceutical users and the wider implementation of detection and law enforcement strategies (that is, sobriety testing and/or RDT). Some benzodiazepine users, particularly males and daily users, are more likely to drive within three hours of use and, therefore, need to be considered in the development of countermeasures.

Polydrug use

1. There is evidence that the use of multiple drugs (that is, polydrug use) is a considerable concern from a road-safety perspective.
2. There is evidence that alcohol combined with cannabis or benzodiazepines is the most dangerous drug combination. A considerable proportion of the Internet sample who use these drugs reported driving following their combined use.

3. There is a need for further research into the prevalence and nature of the range of polydrug use (including the range of combinations of alcohol, illicit or pharmaceutical drugs) and the impairing effect on driving ability, as well as the development and implementation of countermeasures to address such behaviour.

Concluding comments

Drug driving is a considerable road safety concern. While in recent years there has been some progress in addressing this issue, including some research into the prevalence, impairment and attitudes towards drug driving, and the recent trials and implementation of detection and enforcement countermeasures, the field is very much in its infancy. Clearly, more needs to be done, particularly in terms of the development and implementation of information and education initiatives, and the evaluation of drug-driving countermeasures. To do this, there needs to be greater collaboration between sectors, such as road safety, drug and alcohol and law enforcement, as well as between researchers, policy makers and practitioners, to ensure that effective drugs and driving road-safety countermeasures are implemented. Finally, the key messages that have emerged from this research are that:

- Road-safety countermeasures need to focus on the impairment associated with drug use, and not drug use *per se*. Consistent messages need to be provided to the broader community about drug-impaired driving, and should include all classes of impairing drugs, including illicit drugs, alcohol and the impairing pharmaceutical drugs.
- There is a clear need for commitment from the range of stakeholders with remits in road safety and drug education, to implement sustained, widespread information and education campaigns, in order to inform the community about drugs and driving. Coordinated and consistent messages should be delivered through mass media campaigns as well as through targeted initiatives to drug-using populations.

1

Introduction

Australian efforts to increase road safety, such as initiatives targeting drink driving, speeding and the use of seat belts, have seen considerable reductions in road trauma in the past 30 years (Australian Transport Council, 2003; Faulks & Irwin, 2007). Stewart (2006) has provided the most recent, comprehensive international review of issues in drugs and driving, including the prevalence of drug driving, impairment, enforcement and legal issues. Evidence suggests that drugs other than alcohol, both illicit and licit, also contribute to risky driving behaviour and are associated with road trauma (Aitken, Kerger & Crofts, 2000; Davey, Davey & Obst, 2005; Faulks & Irwin, 2007; Kelly, Darke & Ross, 2004; Longo, Hunter, Lokan, White & White 2002; Stewart, 2006). In an influential report to the United States Congress on the use of drugs and the effects on road safety, Compton (1988) suggested that, in order to determine the relationship between drug use and road safety, several pieces of information are required, including: information about which drugs impair driving ability; which drugs are associated with higher crash rates; what drug dosage levels are associated with impaired driving or higher crash rates; and the prevalence of use.

Although there is a growing body of research on the topic, there remain many questions regarding drug driving in Australia. For instance, little is known about the prevalence of drug driving within the general population, or about the attitudes and perceptions of drivers (both those who drive after using drugs and those who do not) in relation to drug driving. Such information is important in the development of effective prevention and road safety initiatives. Further, much of the previous research, policy and media attention have focused on illicit drugs. There is increasing evidence that many pharmaceutical drugs have impairing effects on driving ability. There is, however, little information regarding the prevalence of driving following pharmaceutical drug use and the community's attitudes and perceptions towards the use of such drugs and driving.

It is the aim of this research to address some of the gaps in the knowledge by exploring the Australian community's attitudes, experience and understanding of drug driving, including alcohol, illicit drugs and pharmaceutical drugs. The ultimate aim is for this research to inform the development of effective policy, information and education campaigns in relation to drugs and driving.

2.1 Aims

1. To examine knowledge, perceptions and behaviour regarding driving under the influence of psychoactive substances, including alcohol, illicit drugs and prescription drugs, of both users and non-users.
2. To inform the development of prevention initiatives and resources for the wider community in relation to drugs and driving.

The methodology employed for this research consisted of three stages: a literature review, key stakeholder interviews and an Internet survey.

Ethics approval for this study was obtained from the Victorian Department of Human Services, Human Research Ethics Committee.

2.2 Literature review

A literature review was first conducted to gain an understanding of existing evidence regarding drugs and driving. The aim of the literature review was to scope the existing literature to inform the development of the key stakeholder interview schedule and the design of the Internet survey. This review has taken into account the relevant peer-reviewed and high-quality grey literature. Comprehensive literature searches were conducted and the following electronic databases were explored to identify suitable studies: Medline; Psychinfo; Drug; ScienceDirect; Social Science Plus; Expanded Academic ASAP, Google and PubMed.

2.3 Key expert interviews

In-depth, focused interviews were conducted with key experts in the alcohol and drug and the road safety sectors. The aim of these interviews was to explore

the main issues in relation to drug driving, including prevalence, impairment, attitudes and perceptions, as well as road-safety countermeasures. An interview schedule was designed to elucidate their opinions in regard to these issues.

Twenty key experts from around Australia were interviewed as part of the research. Key experts were drawn from a range of sectors with expertise in drugs and driving, including police with drugs and driving remit (n=2); driving and road authorities (n=4); drug education and information personnel (n=4); an event promoter at raves and clubs (n=1); a pharmacist peak body representative (n=1) and key researchers from a range of disciplines in the drugs and driving sector (n=8).

Interviews took approximately 30 minutes and the majority of the interviews were conducted over the telephone, although four were conducted face-to-face. All interviews were recorded and transcribed by the interviewer, and the transcripts were downloaded into NVivo for analysis. A thematic analysis was conducted, with the individual comments coded into a thematic coding tree. Direct quotes from the key stakeholder interviews are used to illustrate/clarify the themes reported in the following sections.

2.4 Internet survey

The design of the Internet survey was informed by the aims of the study, as well as by the review of the literature and the preliminary analysis of the key stakeholder interviews. As such, the survey collected basic demographic information about respondents, including sex, age, state or territory and postcode of residence, as well as information about education and employment status. This information allowed for comparisons to be made between the general Australian population and this project's Internet sample.

Both state or territory and postcode of residence were collected to enable the screening out of non-Australian or “mischief” respondents, whereby respondents whose reported state or territory and postcode were not consistent, were deleted. Further, respondents aged younger than 16 years were also screened out of the sample, given that across all Australian jurisdictions the minimum age for obtaining a Learner’s Driving Permit is 16 years. Respondents were also asked about their driver’s license status and whether they had driven a vehicle in the previous 12 months (on the basis of which they were determined to be “recent drivers” or “non-drivers” for the purposes of this study).

Consistent with the aims of the study, the Internet survey also included sections on respondents’ perceptions of risk for driving under the influence of a range of psychoactive substances, including alcohol, illicit drugs and prescription drugs, their knowledge regarding how long after consuming these substances it would be safe to drive, how much they knew about the effects of these substances on driving ability, where they had got their knowledge from in the past and where they would like to get such information from in the future.

Respondents were also asked questions about their use of a range of substances in the 12 months preceding survey completion. The substances listed, including alcohol and illicit drugs, were based on those in the National Drug Strategy Household Survey to enable comparison between the samples. In relation to pharmaceutical drugs, while there are a number of medicines that have the potential to impair driving, the three main pharmaceutical drug groups that have been implicated in drug driving are benzodiazepines, analgesics and prescription stimulants (Ogden, 2004) and were thus selected for this survey.

The “recent drivers” were also asked a range of questions regarding their driving behaviours and decisions related to each substance they reported use of. In relation to past and potential future drug-driving behaviour, with the exception of alcohol-related questions, respondents were asked whether they had driven within three hours of using a specific substance in the previous 12 months (and how likely it was that they would do

so in the following 12 months). There is great diversity, and considerable contention, regarding the timeframe for the impairing effects of different drugs. To minimise confusion for respondents, however, and following examination of the literature and consultation with leading researchers in the field (Papafotiou, 2006, Personal Communication) a three-hour time frame was used as it was deemed that three hours would capture the majority of the impairing effects of drugs. In relation to alcohol, respondents were asked whether they had driven while under the influence in the previous 12 months; that is, with a blood alcohol concentration (BAC) of .05 or higher, or how likely it was that they would do so in the following 12 months.

Finally, respondents were asked a range of questions about their experience of and attitudes towards alcohol- and drug-related countermeasures, such as random breath testing (RBT), sobriety testing and roadside random drug testing (RDT).

Prior to commencing the Internet survey, potential respondents were directed to an information page outlining the aims and design of the research. Following submission of completed surveys, respondents were thanked for their participation, asked to forward the link to their contacts and given the Internet link to the Australian Drug Foundation’s drug driving site for further information, as well as the contact details for DirectLine, a 24-hour telephone counselling service.

The Internet survey was hosted on Turning Point Alcohol and Drug Centre’s secure server, with appropriate support from the organisation’s information technology unit. Respondents were required to follow a link to the questionnaire on the Turning Point website. On completion, the survey data was stored on the Turning Point server and was accessible only to the research team. A web HTML format was chosen to deliver the questionnaire as it provided a familiar, interactive format that was highly flexible. The design chosen allowed for the automated collection of data that held substantial benefits in terms of data entry costs and speed. The software used to develop the Internet survey was limited to the degree to which it constrained data entry to prevent contradictory errors, although there was the

ability to limit the way in which respondents answered questions, such as being allowed to tick only one box.

Advertising and promotional campaign

The Internet survey was utilised with the view to gaining access to a significant number of Australians to participate in the research and capture a broad range of community views and experiences. An integrated advertising and promotional campaign was conducted to raise public awareness of the research and stimulate participation in the Internet survey. This included the following communication tools.

Viral email campaign

Upon launch of the Internet survey, researchers and the funding partner initiated a viral email campaign (containing a link to the survey and appeal to participate), which directly targeted family, friends and colleagues across Australia. This campaign solicited thousands of responses to the survey within weeks.

Media releases/media relations

A series of media releases were issued to Australian media outlets nationally and, subsequently, selected journalists were followed up to gauge their interest and offer interviews with the researchers. These media releases were:

- "AAMI announces funding of independent drug-driving research", media release issued nationally by AAMI, 13 November 2006
- "Prescription for disaster: drivers ignore drug warnings", media release issued nationally by AAMI, 5 December 2006
- "Online drug-driving survey records 2500 participants but more still needed", media release issued nationally by Australian Drug Foundation (ADF), 5 December 2006
- "Regional drivers urged to have their say", media releases issued by ADF, 8–15 February 2007 (regional Victoria, New South Wales and Queensland only).

This activity generated broad and prominent coverage of the survey (and drug-driving issues generally) in print and electronic media. For example, the regional media releases (issued 8–15 February 2007) generated 14 newspaper clippings, 16 radio interviews, 15 television stories and five Internet stories. The initial campaign (November/December) generated four newspaper clippings, 67 radio mentions/interviews and five on-line stories. A significant number of these radio interviews and news reports were syndicated nationally throughout regional Australia, substantially increasing the reach of the call-to-action to participate in the survey.

Advertising campaign

After two months of data collection, and examining the initial response demographics, an email advertising campaign was conducted to reach particular states and regions that were proportionally under-represented. An email inviting participation in the Internet survey was distributed via the NineMSN member database. It was a requirement that members (and therefore, respondents) had to be 18 years of age or older and were filtered by state or territory. The quantity of emails distributed (4100) was determined by the number of responses required from each state or territory, and based on an expected response rate of 5 per cent. In addition, NineMSN provided extra advertising space in the form of "content clips". These were small sections within the *TV Week*, *NW* and *Nine News* electronic member newsletters, which included links to the Internet survey.

Limitations of the Internet survey

Sampling biases are an issue in this methodology, where the sample was limited to those who are computer literate and have access to a computer. The Internet method chosen could not prevent people visiting the site and submitting more than one completed survey. In a more sophisticated design, this may be addressed through a number of strategies, including the use of "cookies" (small files that identify that a certain computer has already visited a website), although this technology has both limitations and implications for respondent confidentiality. Internet participants were not reimbursed for their participation, which meant that

the sample was highly self-selected. It is possible that reimbursement might lead to much greater rates of participation and a broader sample. This issue can also be addressed in a number of ways, including through the use of a voucher system. Finally, as with all forms of survey, the Internet survey relied on self-report, which is open to many biases. There was no way of ensuring that respondents were what they claimed to be. While this may be the case with all survey methods to some degree, in this format there was no way to ensure that the person filling out the survey is not an inappropriate respondent (although this issue can also arise with mail-out surveys). As discussed above, data pertaining to respondents' state or territory and their postcode was collected, to allow for the screening out of potential non-Australian respondents and those reporting an age of less than 16 years.

2.5 Internet respondent demographic characteristics

A total of 7367 respondents completed the on-line survey. After screening out participants under 16 years of age, those who failed to provide state or territory and/or postcode, where reported state/territory and postcode were inconsistent, or where an "impossible" postcode was provided, a sample of 7089 remained. The sample size was further refined by excluding those who stated that they had not driven a vehicle in the previous 12 months (n=288), leaving 6801 to be considered the "total" sample for the purpose of this report. Nearly two thirds (61.9 per cent) of the driving sample were female and the mean age of the sample was 37.9 years (SD 13.2; range 16–84). Respondents came from all states and territories in Australia and, reflecting the distribution of the general population, primarily resided on the eastern seaboard, in New South Wales, Victoria and Queensland. The number and proportion of the sample compared to the proportion of the general population (2001 Australian Census, Australian Bureau of Statistics) are presented in Table 2.1.

Table 2.1: Respondents' state/territory of residence

State/territory	Number of respondents	Percentage of Internet respondents (N=6801)	Percentage of general Australian population*
ACT	129	1.9	1.6
NSW	2303	33.9	33.7
NT	52	0.8	1.1
QLD	1113	16.4	18.7
SA	519	7.6	7.8
TAS	223	3.3	2.4
VIC	1888	27.8	24.9
WA	574	8.4	9.8
Total	6801	100.1	100

* Figures are from the 2001 Census of Population and Housing Australia, Australian Bureau of Statistics (n=14 856 774)

All respondents except for 74 reported on the highest level of education they had completed, with over two-thirds (70.3 per cent) having completed Year 12 or equivalent (Table 2.2). A small proportion of respondents (3.2 per cent) reported that they were still at school. Compared to the general population (2001 Australian Census, Australian Bureau of Statistics), Internet respondents were less likely to have completed Year 10 (or equivalent) or less, and more likely to have completed Year 12 (or equivalent).

Table 2.2: Highest level of school education completed

Year of education	Number of respondents	Percentage of Internet respondents (n=6801)	Percentage of general Australian population*
Did not go to school	2	0.03	1.0
Year 8 or below	100	1.5	9.4
Year 9 or equivalent	199	2.9	7.5
Year 10 or equivalent	1115	16.4	23.8
Year 11 or equivalent	579	8.5	9.6
Year 12 or equivalent	4732	69.6	37.7
Still at school	**	**	3.3
Not stated	74	1.09	7.7
Total	6801	100	100

* Figures are from the 2001 Census of Population and Housing Australia, Australian Bureau of Statistics (n=14 856 774)

** Not a response option in the Internet survey

Respondents were also asked whether they had completed a trade certificate or other educational qualification, with over two thirds (70.4 per cent; n=4788) reporting that they had done so. The highest qualifications obtained by respondents are presented in Table 2.3. Again, compared to those of the general population (Australian Bureau of Statistics, 2001), the Internet sample was highly educated, with twice as many reporting having completed a bachelor degree, four times as many a masters or postgraduate qualification and four times as many having completed a doctorate.

Table 2.3: Highest qualifications obtained

	Number of respondents	Percentage of Internet respondents (n=6801)	Percentage of general Australian population*
None	2013	29.6	53.8
Non-trade certificate**	600	8.8	15.8
Trade certificate	774	11.4	
Associate diploma**	572	8.4	6
Undergraduate diploma	298	4.4	
Bachelor degree	1528	22.5	9.7
Master's degree, postgraduate degree or postgraduate diploma	881	12.9	2.7
Doctorate	127	1.9	0.5
Not stated	8	0.1	11.5
Total	6801	100	100

* Figures are from the 2001 Census of Population and Housing Australia, Australian Bureau of Statistics (n= 14 856 774)

** Different categories were employed in the two studies

All but seven respondents reported on their current employment status, with the majority (79.7 per cent; n=5412) being employed on some basis (Table 2.4).

Table 2.4: Employment status

	Number of respondents	Percentage of Internet respondents (n=6801)	Percentage of general Australian population*
Student**	345	5.1	–
Employed (for wages, salary or payment in kind) or self-employed	5412	79.6	55.9
Not in the labour force (retired or on a pension, unable to work, home duties)	839	12.3	35.4
Unemployed and looking for work	134	2.0	4.4
Other**	64	0.9	–
Not stated	7	0.1	4.3
Total	6801	100	100

* Figures are from the 2001 Census of Population and Housing Australia, Australian Bureau of Statistics (n= 14 856 774)

** Not a response option in the Census

Respondents who indicated that they were employed were asked to specify the industry of their employment. All but 29 answered this question, with substantial proportions reporting working for government (18.9 per cent) or health organisations (20.0 per cent).

Table 2.5: Employment sector

	Number of respondents	Percentage of employed driver sample (n=5526)	Percentage of employed general population*
Agriculture	67	1.2	4.0
Communications	353	6.5	1.8
Construction	181	3.4	6.7
Education	512	9.5	7.2
Energy, water supply	46	0.9	0.7
Finance/ insurance	405	7.5	3.8
Government	1024	18.9	4.5**
Health	1085	20.0	9.7
Hospitality	199	3.7	4.9
Manufacturing	224	4.1	12.2
Mining	61	1.1	0.9
Personal and other services	394	7.3	3.6
Property/ business services	192	3.5	11.1
Recreation services	68	1.3	2.4
Retail trade	294	5.5	14.6
Transport	175	3.2	4.3
Wholesale trade	103	1.9	5.3
Not stated / non-classifiable	29	0.5	2.3
Total	5412	100	100

* Figures are from the 2001 Census of Population and Housing, Australian Bureau of Statistics (n=8 298 606)

** Defined as "Government Administration and Defense" in Census

Summary of demographic characteristics of respondents

The demographic data collected in the Internet survey provides a broad description of the sample as a whole, and the opportunity to compare respondents to the Australian general population. Approximately two thirds of the sample were female, a larger proportion than in the general Australian population. This gender ratio of respondents is, however, consistent with those of other large-scale surveys (for example, 2004 National Drug Strategy Household Survey (NDSHS)). Following the targeted advertising and promotional campaign, the jurisdictions of the respondents reflected closely that of the general Australian population. The Internet respondents were better educated and more likely to be employed than the general population. These differences are likely to reflect the nature of the Internet data collection method used. There is widespread access to the Internet in Australia, predominantly through private homes and the workplace. According to the Nielsen/Net Ratings (Nielsen Media Research, 2006) there were 14 729 191 Internet users as of December 2006, or 70.2 per cent of the Australian population. The large proportion of Internet respondents reporting being employed in health or government organisations could be due to nature of the topic being researched, as well as influence of the recruitment/dissemination drive, such as the viral email initially sent to the project workers' contacts.

2.6 Drug use of Internet respondents

Respondents were asked about their frequency of use of a wide range of drugs over the 12 months preceding their completion of the survey. The proportion of respondents reporting any use of each drug type is presented in Table 2.6, compared to the proportion of the general Australian population estimated by the 2004 NDSHS (Australian Institute of Health and Welfare, 2005). Although the level of recent drug use was higher than that reported in the 2004 NDSHS, this was perhaps to be expected, given the self-selecting nature of the Internet sample. Further, general population surveys, such as the NDSHS, are limited in their capacity to accurately estimate illegal, low-prevalence behaviours such as illicit drug use (Hser, 1993).

Table 2.6: Any reported use in the previous 12 months

	Number of respondents	Percentage of internet sample (N=6801)	Percentage of Australian general population*
Alcohol	6231	91.6	83.6
Cannabis	1635	24.0	11.3
Methamphetamines (powder, base and crystal)	895	13.2	3.2
Cocaine	622	9.1	1.0
Ecstasy	1057	15.5	3.4
LSD/hallucinogenics (acid, psilocybin, magic mushrooms)	368	5.4	0.7
Ketamine	258	3.8	0.3
Heroin	65	1.0	0.2
GHB-type substance (GHB, GBL, 1,4b)	139	2.0	0.1
Prescription stimulants (Dexamphetamine, Ritalin, ephedrine)	180	2.6	**
Benzodiazepines (Valium, Serapax, Temazepam)	276	4.1	1.0***
Analgesics (morphine, codeine)	1097	16.1	3.1***

* Figures from 2004 National Drug Strategy Household Survey (AIHW, 2005)

** The NDSHS did not have this information for prescription stimulants

*** Figures are for non-medical use only

2.7 Overview of the structure of this report

The results of the research as a whole are described in the following four chapters, which focus on the following themes:

- Prevalence (chapter 3)
- Impairment (chapter 4)
- Risk perceptions, knowledge and understanding of drug driving (chapter 5)
- Countermeasures (chapter 6).

Each chapter starts with an overview of the existing literature, then presents the data from the key experts and the Internet survey. A summary and a discussion of the key findings are presented in each of these chapters. Chapter 7 draws together the main findings from each of the primary themes of this research, including a discussion of the limitations of the research and the implications and recommendations for the future.

3

Prevalence

3.1 Literature

There is some evidence to suggest that the prevalence of drug driving in Australia has increased in recent years (De Gier, 2004; Drummer, Gerostamoulos, Batziris, Chu et al., 2004; Drummer, Gerostamoulos, Batziris, Chu et al., 2003; Longo, Hunter, Lokan, White & White, 2000). Such evidence is provided by epidemiological research examining the general population, as well as a range of populations including drug users, offenders and crash-involved populations (Walsh & De Gier, 2004). In addition, the RDT recently implemented in many jurisdictions around Australia provide another source of data on the extent and nature of drug-driving behaviour. Presented below is a summary of the findings of this research.

General population

Estimates from the 2004 NDSHS suggest that 3.3 per cent of the general Australian population aged 14 years and older had driven while under the influence of drugs other than alcohol in the previous 12 months (Australian Institute of Health and Welfare (AIHW), 2005). Of Australians aged 14 years and older who had consumed alcohol in the previous 12 months, approximately 16.0 per cent had driven while under the influence of alcohol (AIHW, 2005).

The Victorian Youth Alcohol and Drugs Survey (VYADS) is a source of information regarding drug driving by young people (Premier's Drug Prevention Council, 2005). The survey was conducted in a single wave of 6005 interviews during the period November 2004 to January 2005. The VYADS has collected data regarding the prevalence of drug use and attitudes towards drugs and drug-related behaviours among young people aged 16 to 24 years. VYADS has consistently found high levels of drug driving reported by participants, whereby, with the exception of the 2002 survey, driving was the

most common activity reported to be undertaken while under the influence of drugs, with 20–25 per cent of participants reporting having done so in the 12 months prior to interview.

While these figures provide some indication of the prevalence of drug driving in Australia, general population surveys, such as the NDSHS and the VYADS, are limited in their capacity to accurately estimate illegal, low-prevalence behaviours such as drug driving (Hser, 1993). Further, the NDSHS and VYADS do not provide detailed information regarding the specific drugs relevant to drug driving, and also fails to examine the extent of pharmaceutical drug driving by Australian drivers.

Given the relative lack of prevalence research in Australia, it is useful to consider some international research. Recent roadside testing conducted in The Netherlands aimed to assess the incidence of drug use among night-time drivers, using urine analysis. Mathijssen (2000) found that 5.4 per cent and 1 per cent of drivers were under the influence of illicit drugs and prescription drugs, respectively. Using self-report questionnaires, Myant, Hope & McIntosh (2006) investigated the prevalence of drug driving in a Scottish sample of 17–39-year-old drivers (n=1398). They found that 6 per cent reported having ever driven under the influence of a drug and 3.5 per cent reported that they had done so in the previous 12 months. In a Canadian survey conducted by Dussault, Lemire, Bouchard & Brault (2000), a total of 5507 drivers were tested using breath or urine tests for drugs and alcohol. According to the toxicological analysis of the 2281 urine samples, drugs were found in the samples of the following proportions of drivers: cannabis (5.2 per cent), benzodiazepines (3.7 per cent), cocaine (1.1 per cent), opiates (1.1 per cent), barbiturates (0.4 per cent) and amphetamines (0.07 per cent).

Crash-involved driver population

Another line of prevalence research is the study of drivers killed or injured in motor vehicle accidents. Research suggests that alcohol is the most commonly detected substance in such cases, followed by cannabis, benzodiazepines, cocaine, amphetamines and opiates (Longo et al., 2000; Mercer & Jeffrey, 1995). A recent study conducted by Drummer (2003) on the involvement of drugs in drivers killed on Australian roads found that, of the 3398 fatally injured drivers sampled, over one quarter (26.7 per cent) tested positive for any type of drug, excluding alcohol. A breakdown of findings by drug type is as follows: alcohol (29.1 per cent), cannabis (13.5 per cent), opioids (4.9 per cent) and stimulants (4.1 per cent) and benzodiazepines (4.1 per cent). Alcohol was frequently found in cannabis positive cases (43 per cent of cannabis cases). Other combinations included cannabis with opioids (1.1 per cent), amphetamines (0.8 per cent) and benzodiazepines (0.7 per cent), as well as amphetamines with opioids (0.05 per cent) and benzodiazepines (0.03 per cent). In a recent Australian study conducted by Chin Wei Ch'ng (2007) approximately one third of injured drivers were found to be drug affected. Cannabis was found to be the most prevalent impairing drug (46.7 per cent) followed by benzodiazepines (15.6 per cent), opiates (11 per cent), amphetamines (4.1 per cent), methadone (3 per cent) and cocaine (1.4 per cent).

It is important to note that these high levels of drug driving are obtained from a sample of drivers involved in motor vehicle accidents and, as such, do not represent the prevalence of drug driving. This data does, however, provide compelling evidence as to the impairing effects that drugs such as cannabis, opiates, benzodiazepines and stimulants have on driving.

RDT evaluation results

In Victoria, since December 2003 the police has been conducting roadside screening for drivers with methamphetamines, MDMA (ecstasy) and the active constituent of cannabis (THC) in their system. Since its inception, data from RDT has been used as an indicator of the prevalence of drug driving. This data is frequently used in media releases to the public, purporting to

represent the extent of drug driving on Australian roads. For instance, according to a Victoria Police media release, approximately 2 per cent of all drivers tested (287 of the 13 176 drivers tested under the program over the period 13 December 2004 to 12 December 2005), tested positive for an illicit drug.¹ The media coverage of such figures is frequently inaccurate and sensationalised, making claims such as:

The rate of drug driving is about 3 times or more that of drink driving (*Courier Mail*, 25th November, 2006)

One in 51 drivers tested were positive to drugs, compared with one in 250 found to be over 0.05 (*Herald Sun*, 13th December, 2006)

When considering the RDT data, it is important to note that the driver screening process is targeted rather than random; that is, the testing focuses on areas of suspected high use, such as truck routes or rave party precincts (Butler, 2007). Furthermore, the findings are from a small sample size and not representative of the general population. Therefore, RDT data provide a very weak indication of prevalence of drug driving in the general population.

Student populations

In a Queensland study conducted by Armstrong et al. (2005), of the 331 students surveyed, 8.2 per cent reported drug driving within the preceding 12 months and 5.7 per cent reported drug driving within the preceding four weeks. Cannabis (8.5 per cent), ecstasy (5.4 per cent) and amphetamines (2.7 per cent) were the most commonly reported drugs associated with drug driving within the preceding 12 months. The specific nature of the sample, as well as the relatively small sample size, limits the extent to which these findings can be applied to groups other than Queensland university students.

In a Queensland study, Davey et al. (2005) examined the driving behaviour of 275 university students who were users of illicit drugs. Approximately 15 per cent of them had engaged in driving while under the influence of drugs during the 12 months prior to the study, with cannabis use the most common at 13 per cent, followed

¹ Victoria Police Media Release, 28 February 2006.

by amphetamines (6 per cent), ecstasy (3 per cent), LSD (2 per cent) and benzodiazepines (2 per cent).

Drug-user populations

The 2004 NDSHS provides some indication of the level of drug driving within drug-using populations, with 23.0 per cent of those who had used an illicit drug in the previous 12 months also reported having driven under the influence of drugs during this time (AIWH, 2005).

Donald, Pointer & Weekley (2006), in a South Australian study, examined drug driving within a sample of illicit drug users (n=91) recruited through advertisements placed in entertainment magazines. In order to meet inclusion criteria, participants had to be at least 18 years of age, have used an illicit drug at least once a month and driven a vehicle at least once a month in the previous six months. Almost all of the participants (98 per cent) reported that they had driven after using an illicit drug in the previous year. For most (88 per cent), the drug consumed prior to their driving (two hours or less) was cannabis, while nearly two thirds (60 per cent) of the sample had done so with methamphetamines. Limitations of this study include a self-selected sample, which could have biased the findings, and the relatively small number of participants.

In an annual study of regular ecstasy users (Johnston & Jenkinson, 2006), it was found that 60 per cent of users reported having driven within an hour of drug consumption. Of those, 70 per cent did so after using ecstasy, speed (70 per cent), cannabis (43 per cent), crystal methamphetamine (24 per cent) and cocaine (15 per cent). A similar trend was mirrored in an annual survey done with Victorian injecting drug users (Jenkinson & Keeffe, 2006), where almost half the sample reported having driven soon after (within an hour of) taking an illicit drug.

Offender populations and detainees

Data regarding levels of drug driving have also been obtained from offending populations. Urinalysis drug detection testing for six major drug classes was conducted on a sample of traffic detainees from four Australian police stations, over a three-year period

(Poyser, Makkai, Norman, & Mills, 2002). Of the 564 detainees tested, 70 per cent (n=395) were found to be positive for at least one drug, with more than half (55 per cent) of the sample testing positive for cannabis use. Approximately one third (38 per cent) of detainees tested positive for more than one drug. Since a sample of traffic detainees is not representative of the general Australian driver population, more information is needed in order to assess the true prevalence of drug driving within the general population.

A large ongoing study involving detainees is the Drug Use Monitoring in Australia, which involved 3786 detainees being interviewed over a three-year period from 1999 to 2001. Of those detainees who had driven in the previous 12 months, more than half (55 per cent) reported having driven under the influence of drugs in that time, with cannabis (42 per cent) and methamphetamines (30 per cent) being the drugs detainees most commonly reported (Mouzos, Smith, & Hind, 2006).

Summary

There is limited evidence regarding the prevalence of driving under the influence of illicit or pharmaceutical drugs by the general Australian population. The available evidence suggests, however, that compared to drink driving, drug driving is relatively uncommon in the general population, although more prevalent among younger than older drivers. There is a growing body of evidence regarding the drug-driving behaviours within specific drug-using populations, which indicates that it is, as may be expected, a more common occurrence within these groups, with driving following cannabis and methamphetamine use most frequently reported. These drugs, along with alcohol and benzodiazepines, have been found to be those most likely to be associated with road accidents. It is clear that there is a need for more research into the prevalence of both illicit and licit drug driving within the general population of Australian drivers.

3.2 Key expert interviews

In the main, the key experts described the difficulty in obtaining an accurate indication of the prevalence of drug driving in the general population. They indicated a number of reasons for this. First, there are many different types of “drug” driving, including licit and illicit drugs. Second, there are different aspects to impairment, ranging from the immediate impairment following use to the impairment that comes from a drug having been in someone’s system for a long time, or even having left their system.

The experts discussed that, due to a range of complexities, it is difficult to ascertain the prevalence of drug driving:

E5: In terms of how often [drug driving] occurs, that’s an issue that at this stage is not well established.

Expert 4 suggested that drug driving is an issue that people are becoming increasingly aware of, but noted that this does not necessarily mean that the prevalence of drug driving has increased. A number of the experts did, however, feel that drug driving is fairly prevalent. Expert 11 claimed that drug driving is “out there and it’s fairly common”.

Expert E19 highlighted that drug driving is a significant issue, citing figures indicating an over-representation of drivers killed in motor vehicle collisions with drugs detected in their system. This expert went on to suggest that this finding is not surprising, considering changes in the entire social context of drug use in the community:

E19: From 2001 to 2005 we’ve gone from 29 per cent of drivers killed in Victoria with drugs present, to 40 per cent. When we look at the presence of amphetamine-type substances and cannabis, that’s also increased over that same period from 16.5 to 24.4 per cent.

Experts raised polydrug use as a significant issue. For example, E19 claimed that “statistics indicate that there is a significant level of polydrug use ... almost 70 per cent [of drug use] is polydrug use”.

E20: We know that very few people use just one particular drug. Even if they’re taking [ecstasy] pills, most of the time it’s not MDMA pure; it’s usually a mix of substances. Polydrug use is a major concern to us, there’s no doubt about that.

Three of the experts reported that drug driving is not particularly prevalent within the general community, but that it is within the drug-using community, with cannabis and amphetamines being the most common drugs used by young drug users who drive under the influence (E10).

E7: Amongst the general population it probably isn’t hugely prevalent but amongst the drug using population ... it probably is a high percentage.

Experts discussed the various sources of data that are used to gain an indication of the prevalence of drug driving, including drug-use statistics, crash statistics and RDT statistics. First, two of the experts asserted that the extent of drug driving may be based on the extent of drug use in the population. For example, there was the suggestion that drug driving is fairly common, given that drug use is widespread:

E13: I suppose drug use is very prevalent and so drug driving would probably be very prevalent.

Second, three of the experts reported that, while the detection of alcohol in fatal and non-fatal crash statistics has decreased in recent years, the detection of drugs other than alcohol has risen slightly. For example:

E17: There’s been a slight decrease over time in terms of the prevalence of alcohol-related fatal injuries, but there’s been an actual increase in the prevalence of accidents resulting in fatal injuries where a substance other than alcohol is present in the system of the driver.

Expert 8 suggested that drug-related road accidents are costing governments “billions of dollars”. He went on to say that the introduction of initiatives to counter drug driving, namely RDT, is an indication that drug driving has come to be an increasingly prevalent societal issue that needs to be addressed.

Some experts did raise some doubts over the value of crash statistics, suggesting that the association between drug use and crash risk is unclear at present. That is, it is not known to what extent drugs are the causal factors in road accidents. The suggestion was that, just because someone involved in an accident has consumed a drug, does not mean that the drug was the reason that the accident occurred. Experts indicated that more research is required to better understand the relationship between levels of drug use and crash risk.

E13: We still don't know the extent to which different drugs increase crash risk ... Drugs do turn up quite commonly in fatally injured drivers, but the extent to which they're actually contributing to crashes I think is unclear. So I think it is an issue, but the size of the issue I'm not sure about just yet.

Finally, in recent years with the implementation of RDT units around Australia, RDT and the figures obtained from such testing have been used as indicators of the prevalence of drug driving. Some of the experts interviewed explicitly warned against making assumptions about the prevalence of drug driving based on RDT statistics. For example, Expert 5 indicated that RDT is not set up randomly; rather, it targets specific "drug prone" settings. This means that the percentage of drivers found to have drugs in their system is not representative of the general community.

E5: There have been some reports with the recent saliva testing [in Victoria] that one in 50 drivers are driving under the influence of either cannabis or amphetamines, but we have to take into consideration that they're actually targeting areas like rave clubs or truck drivers, so whether those percentages extend to the general public, that's still something that we're not really sure about.

3.3 Prevalence of drug driving reported by Internet respondents

Respondents who reported that they had driven within the previous 12 months (n=6801) and had used alcohol, illicit drugs and/or pharmaceutical drugs in the previous 12 months were asked a number of questions regarding

their drug-driving behaviour. Overall, nearly two thirds (29.9 per cent) of drivers reported having driven under the influence of any drug other than alcohol (including pharmaceutical drugs) and 16.9 per cent reported having driven under the influence of any illicit drug (not including alcohol or pharmaceutical drugs).

The findings regarding the prevalence of drug driving by all recent drivers (n=6801) pertaining to each drug type are presented in Table 3.1.

Table 3.1: Drug-driving behaviour reported by Internet respondents

Drug	Percentage of all drivers (n=6801) reporting drug driving within the previous 12 months
Alcohol*	12.6
Cannabis	12.3
Methamphetamines	6.9
Ecstasy	5.8
Cocaine	3.1
LSD/hallucinogens	0.8
Ketamine	0.7
GHB-type substances	0.5
Heroin	0.5
Prescription stimulants	2.3
Benzodiazepines	4.0
Analgesics	15.0

* Phrased in terms of "under the influence of alcohol" (BAC > .05)

In relation to alcohol, 12.6 per cent of all drivers reported that they had driven under the influence of alcohol (that is, over the legal BAC of .05) in the previous 12 months. Of the illicit drugs asked about in the Internet survey, respondents most commonly reported driving within three hours of using cannabis. Indeed, more than one in 10 respondents reported that they had done so within the previous 12 months, a rate comparable to that reporting driving under the influence of alcohol. The proportion of drivers reporting driving within three hours of using methamphetamines, ecstasy or cocaine are also all relatively high, especially compared to the relatively low rates of driving after using LSD/hallucinogens, ketamine, GHB-type

substances and heroin reported by respondents. This is likely to be accounted for, at least in part, by the relatively low prevalence of use of these drugs. In relation to the pharmaceutical drugs examined in the Internet survey, a considerable proportion of respondents reported driving within three hours of using analgesics (15 per cent), with smaller proportions reporting doing so after the use of prescription stimulants (2.3 per cent) and benzodiazepines (4 per cent). Indeed, across all of the substances asked about in the Internet survey, analgesics was the category that respondents were most likely to report having driven within three hours of using.

Previous research has suggested considerably higher rates of drug driving by drug-using populations, when compared to the general population. Accordingly, the drug-driving behaviours of drivers reporting use of each of the licit and illicit drugs are presented in Table 3.2.

Table 3.2: Prevalence of drug driving reported by drug users from Internet sample

Drug (number of users)	Percentage of users reporting driving within 3 hours of consuming drug
Alcohol* (n=6231)	13.8
Cannabis (n=1635)	51.3
Methamphetamines (n=895)	52.7
Ecstasy (n=1057)	37.5
Cocaine (n=623)	33.4
LSD/hallucinogens (n=368)	14.7
Ketamine (n=258)	19.4
GHB-type substances (n=139)	25.9
Heroin (n=65)	52.3
Prescription stimulants (n=363)	43.0
Benzodiazepines (n=891)	30.3
Analgesics (n=2276)	44.8

* Phrased in terms of "under the influence of alcohol" (BAC > .05)

In relation to alcohol, 13.8 per cent of drivers who reported having consumed alcohol in the previous 12 months reported having driven while having a BAC of .05 or more in the previous 12 months. This is a similar proportion to that in the total driving sample reporting drink driving in the previous 12 months, due to the high prevalence of drinking in the sample. In comparison, over half of the drivers who reported using methamphetamine, cannabis and heroin in the previous 12 months reported driving within three hours of using these substances during that period of time. However, given the small number of respondents reporting recent use of heroin, the findings in relation to driving after using heroin should be considered with caution. Approximately one third of respondents reporting recent use of ecstasy or cocaine reported having driven within three hours of using these substances. Considerable proportions of respondents also reported driving within three hours of use of analgesics (44.8 per cent), prescription stimulants (43.0 per cent) and benzodiazepines (30.3 per cent).

Prevalence of polydrug use and driving

Internet respondents who reported having driven under the influence of alcohol, illicit drugs and/or pharmaceutical drugs in the previous 12 months were asked what combination of drugs they had used the last time they had done so. Data pertaining to four combinations were explored: alcohol and cannabis; alcohol and ecstasy; alcohol and methamphetamines; and alcohol and benzodiazepines (see Table 3.3). Overall, 9.1 per cent of the total sample reported having driven after using one of these combinations. These combinations were chosen based on the evidence from the literature review and key expert interviews that they are associated with high levels of driving impairment and/or are relatively common combinations.

Table 3.3: Proportions of polydrug users			
Polydrug driving combination	As a percentage of all drivers (n=6801)	Proportions of drivers who used alcohol in the previous 12 months (n=6231)	Proportions of drivers who used drugs other than alcohol in the previous 12 months
Alcohol and cannabis (n=280)	4.1	4.5	Cannabis 17.1 (n=1635)
Alcohol and ecstasy (n=149)	2.2	2.4	Ecstasy 14.1 (n=1057)
Alcohol and methamphetamines (n=130)	1.9	2.1	Methamphetamines 14.5 n=895)
Alcohol and benzodiazepines (n=64)	0.9	1.0	Benzodiazepines 7.2 (n=891)

A total of 280 respondents indicated that the last time they had driven within three hours of using more than one type of drug they had used a combination of alcohol (that is, with a BAC above .05) and cannabis. This represents 4.1 per cent of the total sample, 4.5 per cent of those who had consumed alcohol in the previous 12 months, and 17.1 per cent of those who had consumed cannabis in the previous 12 months.

Approximately 2.2 per cent of the total sample indicated that the last time they had driven within three hours of using more than one type of drug they had used a combination of alcohol and ecstasy. This represents 2.4 per cent of those who had consumed alcohol in the previous 12 months, and 14.1 per cent of those who had consumed ecstasy in the previous 12 months.

A total of 130 respondents reported that the last time they had driven within three hours of using more than one type of drug they had used a combination of alcohol and methamphetamines. That is, 1.9 per cent of those who had driven in the previous 12 months, 2.1 per cent of those who had consumed alcohol in the previous 12 months, and 14.5 per cent of methamphetamine users.

Sixty-four respondents indicated that the last time they had driven within three hours of using more than one type of drug they had used a combination of alcohol and benzodiazepines. This represents 0.9 per cent of those who had driven in the previous 12 months, 1 per cent of those who had consumed alcohol in the previous 12 months, and 7.2 per cent of those who had consumed benzodiazepines in the previous 12 months.

When interpreting these findings it is important to remember that respondents were asked about a discrete drug-driving episode in the previous 12 months, specifically the most recent occasion they had driven within three hours of taking drugs, and thus the figures are likely to provide a considerable under estimate of the prevalence of polydrug driving within the 12-month period prior to survey.

Characteristics of drug drivers

The age, gender and patterns of drug use (that is, frequency of use) of respondents that reported having driven in the preceding 12 months were examined. Those drugs most commonly implicated in road trauma, that is, alcohol, cannabis, amphetamines/ecstasy and benzodiazepines, were the focus of the analysis.

Gender

As presented in Table 3.4, a significantly larger proportion of males than females reported driving under the influence of alcohol ($\chi^2 (1, 6234) = 76.00$ $p < 0.001$). Similarly, a significantly higher proportion of males than females reported driving within three hours of using cannabis ($\chi^2 (1, 1634) = 66.95$ $p < 0.0001$) and within three hours of using ecstasy ($\chi^2 (1, 1059) = 11.03$ $p < 0.001$).

Table 3.4: Proportions of drug drivers by gender

	Gender	
	Male (%)	Female (%)
Driving under the influence of:		
Alcohol*	18.6 (n = 2365)	10.8 (n = 3870)
Cannabis**	61.8 (n = 787)	41.5 (n = 848)
Ecstasy*	42.7 (n = 499)	32.6 (n = 561)
Methamphetamines	54.8 (n = 431)	50.8 (n = 465)
Benzodiazepines**	37.5 (n = 368)	25.3 (n = 521)

* p < 0.001

** p < 0.0001

A different picture was obtained for those driving within three hours of using methamphetamines, with a similar proportion of males and females reporting having done so in the previous 12 months (χ^2 (1, 895), ns). Finally, although a higher proportion of females reported driving within three hours of using benzodiazepines, males were found to drive under the influence of these pharmaceutical drugs in a significantly larger proportion compared to females (χ^2 (1, 888)=16.00 p<0.0001).

Age

Table 3.5 presents the proportions of drug drivers based on their age groups. Those drivers within the 20–29-year age group were most likely to report having driven while under the influence of alcohol (that is, with a BAC over .05) in the previous 12 months, with 21.4 per cent reporting having done so.

As can be seen from Table 3.5, high proportions of cannabis users across five of the six age groups reported that they had driven a motor vehicle within three hours of using cannabis in the previous 12 months, with the exception being those aged 60 years and older. Indeed, over half of the cannabis users aged 16–19 years and 40–49 years, and approximately half of those aged 20–29 years, 30–39 years and 50–59 years reporting having done so.

In comparison, ecstasy users from the 16–19-year and 20–29-year age groups were most likely to report that they had driven a vehicle within three hours of using ecstasy in the previous 12 months. Similar to the findings related to cannabis drug driving, high proportions of methamphetamine users across the age groups reported that they had driven a motor vehicle within three hours of using methamphetamines in the previous 12 months. Over half of the methamphetamine users aged 16–19, 20–29, 40–49 and 50–59 years and approximately half of those aged 30–39 years report having done so. The levels of driving within three hours of using benzodiazepines were also relatively consistent across the age groups, with between approximately one quarter and one third of benzodiazepine users in each age group reporting that they had done so in the 12 months prior to completing the survey.

Table 3.5: Proportions of drug drivers by age group

Driving under the influence of:	Age groups					
	16–19	20–29	30–39	40–49	50–59	60+
Alcohol (%)	17.5 (n=234)	21.4 (n=1923)	11.7 (n=1546)	10.6 (n=1230)	8.3 (n=928)	4.1 (n=368)
Cannabis (%)	57.5 (n=97)	49.5 (n=748)	49.0 (n=498)	60.0 (n=251)	47.3 (n=91)	10.0 (n=234)
Ecstasy (%)	47.4 (n=76)	42.0 (n=633)	27.4 (n=259)	26.0 (n=77)	50.0 (n=15)	--
Methamphetamines (%)	58.5 (n=53)	55.7 (n=533)	44.0 (n=225)	53.0 (n=72)	54.0 (n=13)	--
Benzodiazepines (%)	34.6 (n=26)	32.0 (n=270)	27.6 (n=210)	30.0 (n=167)	35.0 (n=137)	24.1 (n=79)

Drug drivers by frequency of use

It was of interest to explore whether drug driving was related to frequency of drug use. Table 3.6 presents the proportion of drivers who reported driving with a BAC of more than .05 in the case of alcohol or within three hours of using the other drugs of interest according to their frequency of use. There was a clear trend for those drivers reporting more frequent patterns of use also to be more likely to report having driven under the influence in the previous 12 months. For instance, 91.0 per cent of daily cannabis users reported that they had driven within three hours of using cannabis during the previous 12 months. In contrast, only 32.4 per cent of users who reported they had used cannabis on a monthly basis or less reported having done so. The findings in relation to driving within three hours of using ecstasy, however, were a little different, with those reporting weekly use most likely to report having done so. It is possible that this reflects common patterns of ecstasy use, with weekly use much more common than daily use.

3.4 Summary

While there is increasing community and law enforcement attention focused on drug driving, previous research into the prevalence of drug driving has provided little information regarding the extent and nature of drug driving on Australian roads. General population surveys such as the NDSHS and VYADS suggest that levels of drug driving are relatively low when compared to those of drink driving.

While providing broad indication of prevalence of drug driving, however, such surveys do not provide information about the specific types of illicit drugs used prior to driving, the extent of driving following polydrug use, or the extent of pharmaceutical drug use and driving. One source of information about the types of drugs Australians use prior to driving are culpability studies, which provide information about the drug use of crash-involved drivers. Alcohol and cannabis are the most commonly detected drugs in these cases. It is important to remember that such figures can only provide an indication of drug use within populations who have had a crash, and thus are not necessarily a good indication of the prevalence of drug driving in general. The data obtained from the RDT is also limited in the evidence it can provide regarding the prevalence of drug driving in the general population, due to the targeting of specific sub-groups of drivers (that is, truck drivers and rave and club attendees) and the fact that not all drugs are tested for by RDT.

The key experts interviewed in this current research confirmed that, due to the limitations of the data sources available, there is a lack of accurate estimates of the prevalence of drug driving on Australian roads. Some key experts suggested, however, that given the relatively high levels of illicit drug use within the general Australian population, it is reasonable to assume that drug driving is also relatively prevalent. Experts argued that drug driving is high within the drug-using community, particularly among cannabis, amphetamines and pharmaceutical users.

Table 3.6: Proportions of drug drivers by frequency of use

Driving under the influence of:	Frequency of use		
	Once a month or less	Weekly	Daily
Alcohol (%)	4.4 (n=2394)	18.5 (n=3414)	29.6 (n=420)
Cannabis (%)	32.4 (n=1063)	84.0 (n=351)	91.0 (n=219)
Ecstasy (%)	34.0 (n=969)	82.0 (n=77)	40.0 (n=10)
Methamphetamines (%)	46.6 (n=772)	93.0 (n=101)	90.0 (n=20)
Benzodiazepines (%)	22.6 (n=716)	47.4 (n=78)	75.0 (n=95)

Given the lack of prior research examining the prevalence of drug driving in Australia, the Internet survey component of the current research provides valuable information. The survey collected information from a large sample of Australian drivers (n=6801) and found that over one quarter (29.9 per cent) reported having driven within three hours of using any drug other than alcohol (including pharmaceutical drugs) and 16.9 per cent reported having driven under the influence of any illicit drug (not including alcohol or pharmaceutical drugs) in the 12 months prior to interview. These levels of drug driving are considerably higher than those reported in the NDSHS.

It is of interest to determine which drugs Australian drivers are using soon before driving. Accordingly, the current research collected information about drugs which respondents reported driving within three hours of taking, or under the influence of (in the case of alcohol), in the previous 12 months. The drug most commonly driven after was analgesics (that is, morphine and codeine), with 15 per cent of drivers reporting that they had driven within three hours of using them in the previous 12 months. An important limitation of the current research is that it was not possible to determine the nature of the analgesic use and related driving behaviours of respondents (that is, type of analgesics used, dosage, adherence or non-adherence to prescribing). What is clear from these findings, however, is that this aspect of drug driving warrants further investigation.

Following analgesics, and consistent with the findings of culpability studies, alcohol, cannabis and methamphetamines were the drugs respondents most commonly reported driving within three hours of using (or under the influence of, in the case of alcohol). Indeed, the findings of the Internet survey suggest that the numbers driving within three hours of using cannabis and under the influence of alcohol are comparable. Driving within three hours of using ecstasy and benzodiazepines were also relatively frequently reported.

Previous Australian drug-driving research has suggested, perhaps unsurprisingly, that levels of drug driving are higher within specific populations, such as regular drug

users and offender populations. Key experts interviewed for the present study also reported this to be the case, noting that this was particularly so within populations of cannabis and methamphetamine users. The findings of the Internet survey component of the present study support these findings. Over half of those drivers who reported using methamphetamines and cannabis reported that they had driven with three hours of using these drugs in the previous 12 months.

A similar level of drug driving was reported by heroin users in the Internet sample, although the relatively small number of respondents reporting such behaviour means that this finding should be interpreted with caution. This finding is, however, consistent with previous research with intravenous drug-using populations. Further, approximately one third of ecstasy and cocaine users reported having driven within three hours of using these drugs, findings that again are broadly comparable to those of previous research examining drug-driving behaviours among regular ecstasy users. Although the numbers of ketamine and GHB-type substance users in the Internet sample were relatively small, considerable proportions reported having driven within three hours of using these drugs, suggesting that this is another important area for further research.

The use of analgesics and prescription stimulants within three hours prior to driving was reported by nearly half of those reporting use of those drugs, and by nearly one third of benzodiazepine users, further highlighting the need for more detailed research into the prevalence and impairment to driving ability associated with these pharmaceutical drugs.

There is increasing attention on polydrug use. For example, previous research suggests that certain combinations of drugs, in particular alcohol and cannabis, and alcohol and benzodiazepines, lead to greater impairment than if the substances are used on their own. Little is known, however, about the prevalence of driving following polydrug use. Key experts participating in the current research argued that, given that polydrug use is the predominate pattern of drug use in Australia, polydrug use is likely to be a major road safety concern. The Internet survey component of the

current study provides some information about this behaviour, specifically about the polydrug use patterns associated with respondents' most recent drug-driving occasion. The findings suggest that within drug-using groups, such as cannabis, ecstasy and amphetamine users, considerable proportions (ranging from 14 to 17 per cent) report taking these substances with alcohol prior to driving. These findings, however, are likely to provide a considerable under estimation of the prevalence of polydrug use by drug drivers, given the focus on one single incident of drug driving. Clearly, there is a need for further research to gain an accurate indication of prevalence and nature of polydrug use and driving.

For the first time, to the research team's knowledge, data was collected in the current study regarding drivers' frequency of drug use, allowing an analysis of the relationship between frequency of use and likelihood of drug driving. Across the five drug types there was a trend for those drivers reporting more frequent use to be more likely to report having driven within three hours of use in the previous 12 months.

Estimates for general population surveys such as the NDSHS and VYADS suggest that younger rather than older Australians are more likely to drive under the influence of illicit drugs, with studies examining the drug-driving behaviour of university students supporting these findings. The findings of the current research suggest this is the case for some drug types, whereby younger rather than older alcohol and ecstasy

users were more likely to report having driven under the influence/within three hours of use in the previous 12 months. These findings suggest that drink-driving messages must continue to target young drivers. The characteristics of those who reported driving within three hours of using ecstasy reflect those who use this drug, whereby younger rather than older Australians are much more likely to use ecstasy, and again reflect the importance of countermeasures targeting young drivers. In comparison, however, cannabis, methamphetamine and benzodiazepine users across all age groups examined were approximately equally likely to report having driven within three hours of using these drugs.

The current study also provides information regarding the gender of drink and drug drivers, with the findings suggesting that male drinkers are more likely to drive under the influence of alcohol than female drivers. Male users of cannabis, ecstasy and benzodiazepines were also more likely to report having driven within three hours of using these drugs in the previous 12 months. However, similar proportions of females and males drove within three hours of methamphetamine use.

Thus, the findings of the present study suggest that drug driving is prevalent within drug-using populations and, further, particularly so among sub-groups of particular drug users (that is, young, male, frequent users). These findings have clear implications for targeted campaigns with drug-using groups and are discussed in more detail in chapter 7.

Impairment

4

4.1 Literature

Understanding the impairing effects of illicit and pharmaceutical drugs is important when considering issues around drug driving. First, there needs to be rigorous and credible scientific evidence on the nature and extent to which drugs impair driving ability. As argued by Compton (1988), an improved understanding of which drugs impair driving ability and the drug dosage levels associated with impaired driving, will assist in focusing on the drugs that are likely to cause serious road safety. Second, it is necessary to gain a clear understanding of the general public's attitudes, perceptions and knowledge levels in relation to the impairment of driving ability associated with the use of a range of licit and illicit drugs. These two components, together, will best inform the development of sound and credible information and education countermeasures for drivers.

Psychoactive drugs are, by definition, those that affect mood, cognition and/or psychomotor functioning. Driving is considered a fairly complex psychomotor and cognitive task, and the use of psychoactive drugs has the potential to impair driving ability (Shinar, 2006). While there is substantial evidence of a direct causal relationship between alcohol and driving impairment (Shinar, 2006), less is known about the impact of other drugs, both licit and illicit, on driving performance (Henry-Edwards, 2004; Shinar, 2006).

The limited available evidence regarding drug driving-related impairment have come from epidemiological (specifically, crash culpability) and experimental studies (that is, simulator and on-road driving studies). Crash-culpability studies provide evidence regarding the drugs implicated in road crashes, but are limited in terms of their ability to assess the role of drug use and the impact of other variables (including gender, age,

health conditions and other risky behaviours, such as mobile phone use, speeding etc.) on the risk of crash involvement (Vingilis & MacDonald, 2000).

Simulator and on-road driving studies aim to determine the nature of impairment produced by specific drugs. The main concern of such studies is that data collected has limited potential to be generalised, as the experimental design and conditions (for example, types of participants, drug dosages and drug-use history) do not necessarily reflect "real world" drug driving (European Monitoring Centre for Drugs and Drug Addiction, 1999; Parliament of Victoria Road Safety Committee, 1996; Vingilis & MacDonald, 2000). Despite such limitations, these experimental studies do have the advantage of being able to target and assess driving impairment of particular high-risk groups, such as young males.

The following section reviews the findings of the growing body of research on the impairing effects of alcohol, illicit drugs, including cannabis, stimulants and opiates, pharmaceutical drugs and polydrug use, on driving ability.

Alcohol

The impairing effects of alcohol on driving ability have been well established through both epidemiological and experimental studies (Ogden & Moskowitz, 2004). In 1974, Borkenstein et al. found that an increase in crash probability was associated with increased BAC. Ogden and Moskowitz (2004) reviewed the research regarding the main effects of alcohol on driver performance, including tracking, vigilance, vision, reaction time and the ignoring of road rules. Tracking, the ability to keep a vehicle within the lane limits and in the correct direction while monitoring for other important information, has been found to be impaired even at low BAC levels. Alcohol-impaired drivers also find it especially difficult

to divide their attention between two tasks, the effect of which decreases their concentration or vigilance. The brain's control of the eyes is highly vulnerable to alcohol, with both the frequency of eye movements and the duration of each fixation showing significant changes with increasing BAC. The process of interpreting complex sensory information can be significantly affected by alcohol consumption. Thus, for instance, an alcohol-impaired driver who performs adequately on a road where there is little traffic may not be able to do so in the city where the traffic is busier. Specifically, there is evidence for significant deterioration in reaction time at a BAC of .07. Finally, drivers with a BAC of less than .05 have been found to have a tendency to ignore driving rules, leading Ogden and Moskowitz (2004) to conclude that in more complex and challenged driving conditions, low levels of BAC would be sufficient to produce errors in driving.

Cannabis

Chipman, Macdonald and Mann (2003) reviewed a large number of international studies that investigated the presence of cannabis use in fatal and non-fatal vehicle accidents. They found that between 1.4 per cent and 27.5 per cent of accidents involved drivers who tested positive for cannabis in their urine or blood. It is important to interpret these figures with caution, however, as detection of the metabolites indicates prior consumption, not the level of impairment experienced at the time of an accident, nor necessarily implies that cannabis use was a cause of the accident. Indeed, until recently, many studies only measured the inactive form of cannabis (carboxy- Δ^9 -THC). This substance is present in the blood for several days after consumption and thus its detection cannot be used as an indicator of impairment. The detection of active THC levels is a more accurate indication as to whether an individual's driving performance was impaired at the time of an accident (Longo, Hunter, Lokan, White & White, 2000).

In an Australian study, Longo and colleagues (2000) conducted a culpability analysis on injured drivers and concluded that there is a significant relationship between THC² when taken in combination with other drugs (including alcohol) but not between THC alone

and culpability. In their 10-year longitudinal culpability study, Drummer et al. (2003) found a significantly stronger, positive correlation when active THC levels were above 5 nanograms per millilitre, making the culpability odd ratios comparable with drivers with a BAC of at least 0.15. In cases in which only the metabolites were present, however, there was no difference in the culpability ratio from drug-free drivers. Thus, the findings of these studies suggest that active THC does impair driving performance. It is important to bear in mind, however, that these studies used samples of injured or killed drivers and, therefore, the findings are limited in their potential to be generalised.

The findings from simulator testing and on-road driving studies, in which participants "drive" after consuming cannabis, suggest that cannabis-influenced drivers have a higher propensity than non-cannabis influenced drivers to hit obstacles, miss signs, drive more slowly and experience slow reaction times (Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004). While the findings from such studies indicate that driving after consuming cannabis may negatively alter drivers' decision making during emergency conditions, it has been argued by some researchers that overall driving ability is not dramatically impaired as drivers do tend to drive more safely by slowing down and maintaining a greater distance in order to compensate (Lenné, Triggs & Regan, 2004; Ramaekers, Berghaus, van Laar & Drummer, 2004; Sexton, Jackson, Tunbridge, Board et al., 2002; Stafford, Degenhardt, Dunn, Fischer et al., 2006). Others, however, argue that driving slowly by no means indicates driving safely. Papafotiou, Carter & Stough (2005) found that driving slower is coupled with a slowing of information processing, whereby attention to stimuli is delayed and attention to maintain a specific position in traffic lanes is impaired, changes that in "real life" would be likely to contribute to road accidents. Papafotiou, Carter & Stough (2005) found that, although cannabis smokers compensate immediately after smoking when the effects of the drugs are obvious, drivers no longer compensate 80 minutes after smoking when effects are not as strong, therefore more errors are observed.

² In this study, forensic laboratories only measured the inactive form of cannabis (carboxy- Δ^9 -THC).

Amphetamines

While at low dosages amphetamines can have stimulating and alerting effects, substantial cognition, reasoning and psychomotor impairments are experienced at higher dosages (Logan, 2002; Neale, 2001). Typical driving behaviours associated with amphetamine use identified in an early United States study conducted by Logan (2002), included drifting out of the lane of travel, weaving, speeding, drifting off the road and high-speed collisions. These driving behaviours are consistent with some of the usual side effects of amphetamine use, such as increased risk-taking, motor restlessness, aggression, disorientation and lack of coordination (Logan, 2002; National Highway Traffic Safety Administration, 2006). Ogden (2006), however, has argued that the greatest risk to road safety from amphetamine use is in the rebound fatigue following long periods of use and wakefulness.

There is, however, little evidence for a relationship between methamphetamine use (or stimulant use more generally) and the risk of road crashes/impaired driving ability. This is due, in part, to the limited number of experimental studies that have been conducted with driving simulators, and the limitations associated with both culpability and experimental studies. In a multi-centre, case-control study conducted on 3398 fatally injured drivers, of all the drug types considered (including alcohol and prescription drugs) stimulants³ had the strongest measured association with culpability (Drummer, 2004). Not only was the culpability ratio of stimulant users 2.3 times those of drug and alcohol-free drivers, drivers were 8.8 times more likely to be responsible for the crash. It is important to note, however, that these findings cannot be generalised to non-fatally injured drivers who use stimulants.

Silver et al. (2005) conducted a study on dexamphetamine and methamphetamine, and found that performance on simple tasks that required attention to one instruction improved with stimulant use. When required to perform more complex driving tasks, such as in day conditions with multi-tasking and attention to several stimuli, however, driving was impaired. This study provides a possible explanation for the discrepancy in the results of studies that have

looked at amphetamines—those that have found improvement have used either low doses or assessed performance using simple tasks, and those that have found impairment have used tasks that require attention to be shifted to various stimuli at once, or even at high doses of the drug.

Research examining the perceptions of daily amphetamine users found that, rather than considering their driving ability impaired following amphetamine use, they tend to perceive the effects positively and consider these to be beneficial to their driving ability (Davey, Davey & Obst, 2005). Specifically, amphetamine users have been found to report that amphetamine use provides them with heightened alertness, sharpens reflexivity and boosts their physical energy (Aitken, Kerger & Crofts, 2000). Similarly, a recent Australian study on illicit drug users found that, although approximately one fifth of the respondents thought that methamphetamine use could significantly impair their driving ability, nearly half (42 per cent) indicated that methamphetamine use could improve their driving ability, at least to a small degree (Donald, Pointer & Weekley, 2006). Degenhardt et al. (2006) suggest that the lack of awareness among many amphetamine users of the potential effects of amphetamine use upon their driving ability may lull them into a false sense of security regarding their actual levels of impairment.

Ecstasy

Findings from a recent driving-simulator study indicated that MDMA use (59 mg) impairs specific cognitive performance, has a moderate negative impact on vehicle control and a decreased sense of risk taking (Brookhuis, de Waard, & Samyn 2004). When considering these findings, however, it is important to note that, since the study was conducted in a driving simulator, the applicability of the findings to real life situations is reduced and that the small sample size ($n=22$) limits the power of the findings. In a recent study, however, Kuypers, Wingen, Samyn, Limbert et al. (2007) found that repeated dosing of MDMA was associated with impaired ability to maintain a lateral position of the vehicle in traffic. This study was conducted over the night time, making the results more applicable to real-life situations.

³ In this study, all substances acting as stimulants were placed into the amphetamine group.

However, again, the findings are limited in that, in using pure MDMA, the research does not represent the “street” ecstasy, which commonly contains a range of substances (such as ketamine).

A study examining perceptions of illicit drug users found that approximately 33 per cent of respondents reported that driving under the influence of ecstasy or following ecstasy use is dangerous, with a small proportion (14 per cent) reporting that the use of ecstasy could lead to a small improvement in their driving performance (Donald, Pointer & Weekley 2006). The majority of participants reported that LSD, ketamine, GHB and inhalants could adversely impair driving ability (Donald, Pointer & Weekley 2006). Despite this, an early Perth study found that, of those who were driven by an impaired driver, most expressed no concern about putting their safety at risk (Lenton & Davidson, 1999).

Opiates

There is limited research on opioids and driving impairment (Kelly, Darke & Ross, 2004). This could be due to the fact that heroin and other opioids are low-prevalence drugs (around 5 per cent of Australians have used heroin at least once in their lifetime), when compared to a more common drug such as cannabis (35 per cent of Australians having used heroin at least once in their lifetime). Overall, findings from experimental studies have not been conclusive as to whether opioids produce psychomotor or psychometric impairment (Lenne, Dietze, Rumbold, Redman & Triggs, 2000). The mixed findings could be due to the variations in the study designs and their varying sensitivities (Chesher, 1989; Kelly, Darke & Ross, 2004; Stoller, Bigelow, Walsh & Strain, 2001; Walker, Zacny, Galva & Lichtor, 2001; Zacny, 1995).

In Drummer et al.’s (2004) study, opiates alone showed positive but statistically non-significant association with culpability. Due to the fact that more than half of the opiate-positive drivers (65 per cent) were polydrug users, the exclusion of these drivers greatly reduces the statistical power of the test and hence should not be interpreted as opiates having no effect on culpability. Another issue that could have influenced the accuracy in this study is that no distinction was made from methadone maintenance patients, who could have been tolerant to the effects of opiates.

Research with long-term heroin users has found that, despite experiencing considerable impairment such as compensated vision, drowsiness, anxiety and irritation after heroin use, many users believe that they are more in control following heroin use compared to when under the influence of alcohol—at least in part attributed to their conscious efforts to drive more cautiously (Aitken, Kerger & Crofts, 2000).

Pharmaceutical drugs

Epidemiological and experimental impairment studies have given increasing attention to the potential impairing properties of medicinal drugs on driving in recent years, mostly on benzodiazepines. Nine major pharmaceutical drug groups that have the potential to impair driving ability have been identified (Alvarez & Del Río, 2000). They are beta-blockers, analgesic–narcotic drugs, anti-diabetics, antihistamine H-1, anti-psychotic drugs, anxiolytic-hypnotics, anti-Parkinsons drugs and anti-epileptics, (Kaba, Danzer & Lehner, 2000). Despite the fact that many pharmaceutical drugs fall within these broad categories, little research has been conducted to ascertain the actual degree of impairment (Vingilis & MacDonald, 2000). The experimental studies that have been conducted have tended to indicate decreased performance due to consumption of benzodiazepines, tricyclic antidepressants, narcotic analgesics and anti-psychotics (Ramaekers, 2003; Vermeeren, 2004).

Indeed, much of the current knowledge regarding the impact of pharmaceutical drugs on driving performance relates to benzodiazepines (de Gier, 2006b; Ogden & Moskowitz, 2004). Vingilis and MacDonald (2000) note that benzodiazepines potentially produce fatigue, lack of muscular coordination, blurred vision and dilated pupils. Culpability studies have provided inconsistent evidence concerning driving impairment under the influence of benzodiazepines. A case-control study analysing the blood sample from 2500 crash-injured South Australian drivers indicated a clear and significant relationship between benzodiazepines and culpability (Longo, Hunter, Lokan, White & White, 2000). Interestingly, Longo et al. (2000) also found a significant relationship between benzodiazepine

concentration and culpability. That is, among those who had a benzodiazepine concentration at or above the therapeutic level, culpability was significantly greater than for the non-user group.

In another study conducted in the Netherlands, it was found that the likelihood of a driver having a motor vehicle crash is five times higher for those who consume benzodiazepines, compared with those who do not (Movig, Mathijssen & Nagel, 2004). In contrast, however, a case-control study analysing the blood sample from 3398 fatally injured crash victims from Victoria, New South Wales and Western Australia suggested weak and insignificant associations of benzodiazepines with culpability (Drummer, 2004). The lack of an association found by Drummer et al. (2004) may have been due to the small number of cases detected with benzodiazepines. Indeed, Boorman and Papafotiou, Carter & Stough (2005) found that, in drivers arrested for driving under the influence, benzodiazepines were the most commonly detected drugs, being detected in 35 per cent of cases.

Another line of research examined the impairing effects of methadone on driving performance, and mixed findings were recorded. While some studies have found that this substance influences driving skills, including reaction time, information processing and visual acuity (Chesher, 1989; European Monitoring Centre for Drugs and Drug Addiction, 1999), others have found no evidence of such impairment (Stoller, Bigelow, Walsh & Strain, 2001). Furthermore, no simulator or on-road driving studies have examined the effects of methadone or other opioids.

Overall, it has been suggested that, although pharmaceutical drugs such as benzodiazepines may impair driving ability, they are most likely to do so during their initial period of use, with long-term use likely to result in tolerance (Premier's Drug Prevention Council, 2005). Indeed, impairment and collision risk have been found to be highest in the immediate two weeks after prescription (de Gier, 2004; International Council on Alcohol Drugs and Traffic Safety, 2001; Kelly, Darke & Ross, 2004; Ogden & Moskowitz, 2004). In a study of 224 734 mature Canadian drivers, a 26 per cent increased crash risk was recorded for those who were

long-term benzodiazepine users (Hemmelgarn, Suissa, Huang, Boivin & Pinard, 1997). Overall, the evidence suggests that benzodiazepines, particularly in higher therapeutic doses and/or at the start of treatment, are most likely to cause an increase in crash risk (de Gier, 2006a).

A second issue in relation to pharmaceutical drugs and driving is that in many cases a patient's medical condition may be in and of itself impairing to driving (for example epilepsy), and that the use of pharmaceutical drugs improves their driving ability (Austroads, 2006). The confounding factor of pre-existing medical conditions also complicates efforts to conclusively determine the impact that pharmaceutical drugs have on driving.

Despite the mixed findings and complicated issues related to pharmaceutical drugs and driving, there is considerable evidence to suggest that some pharmaceutical drugs, benzodiazepines in particular, have a significant impact on driving ability. The recent Victorian Inquiry into Misuse/Abuse of Benzodiazepines and Other Pharmaceutical Drugs (Drugs and Crime Prevention Committee, 2006) highlighted the important need for more research into, and focus on, the use of pharmaceutical drugs and driving.

Polydrug use

Polydrug use, that is, the use of more than one drug at a time, is the prevailing pattern of drug use in Australia (Kelly et al., 2007) and has the potential for a significant negative effect on driving skills (Drummer et al., 2004). There is some evidence of this for the combination of alcohol with cannabis or benzodiazepines, and this is also the case for MDMA in combination with other drugs such as alcohol or cannabis (Drummer, 2004; Hunter, Lokan, Longo, White & White, 1998; Kruger & Vollrath, 2000; Lenné, Triggs & Regan, 2004).

In a simulator study conducted by Brookhuis, de Waard & Samyn (2004) "accident involvement" occurred in approximately 25 per cent of all polydrug users, compared with 20 per cent of those who used ecstasy alone. Ramaekers et al. (2000) assessed the separate and combined effects of cannabis and alcohol on

driving performance (n=80). The combination of THC and alcohol was found to dramatically impair driving performance, particularly in terms of reaction time and time driven out of lane.

A study of injured drivers conducted in South Australia (Longo et al., 2000) found that drivers who tested positive for the combinations of alcohol and benzodiazepines, and alcohol and THC, were significantly more likely to be culpable for the crash, compared to non-drug users. Drummer et al. (2003) found that drivers who tested positive for THC and who had a BAC over 0.05 were 2.9 times more likely to be culpable than drivers who were BAC positive only. This suggests that THC does enhance impairment associated with alcohol. Papafotiou, Carter & Stough (2005) also found that performance was more impaired when cannabis was combined with alcohol (even at low levels) than when cannabis or alcohol was consumed alone, providing strong evidence of an additive effect of consuming more than one psychoactive drug.

Thus, polydrug use, in particular alcohol combined with either cannabis or benzodiazepines, has the potential to impair driving more significantly than if each substance was consumed alone. It is important that research into the impairing effects of drugs not only focuses on specific drugs, but also seeks to understand the impact that polydrug use has on driving ability and road safety.

4.2 Key expert interviews

There was a general consensus among the experts that drugs have the potential to impair driving ability. However, there were some differences between experts in terms of which drugs they regarded as most concerning, and how. Experts discussed cannabis and amphetamines, licit drugs, combinations of drugs and alcohol, in terms of their potential to impair driving ability.

Illicit drugs

Cannabis and amphetamines were highlighted by a number of experts as the drugs of most concern, after alcohol, from a road-safety perspective. However, some of the experts indicated that there is more evidence

to support an association between cannabis use and impaired driving ability, than between amphetamine use and impaired driving ability.

E7: Cannabis is becoming more conclusive ... but I'm aware of some controversy regarding ... how problematic methamphetamines is from an impairment view.

A few experts discussed the evidence that some level of cannabis use can improve driving ability by making people drive more slowly and cautiously. These experts stressed that more recent research suggests that this effect is eclipsed by the fact that judgement is impaired and reaction times increased. Expert 1, for instance, commented that "ability to respond to unexpected things is particularly impairing".

Two main concerns were raised in relation to amphetamine-induced impairment. First, that its use increases risk-taking behaviour, and secondly that it can keep people awake for long periods of time, thus impairing driving ability through fatigue.

E15: It can keep you up over prolonged periods of time, which by the end does make you slightly delirious and can really impair your judgement visually as well as your reaction times and things like that.

Interestingly, a number of experts suggested that amphetamine use can, in some cases, actually improve driving ability by making people more attentive.

E1: If you use a small amount of [methamphetamine] it actually shows an increase in driving ability. You're going to be able to concentrate more effectively.

A further issue is the time between consumption and driving. Some of the experts discussed that the time between consumption and driving greatly influences the associated impairment.

However, Expert 19 highlighted that recent use is where the greatest decrement to ability is present, although there is the issue of rebound fatigue, particularly after stimulant use.

E19: From a driving point of view, recent use is what we're interested in because that's when the greatest decrement to ability is present. But there are other issues surrounding fatigue—such as the crash after stimulant use. It may be that you think the drug is no longer present, but you're still impaired.

It was suggested that those who use drugs on an occasional and recreational basis are less likely than more regular users to drive under the immediate effects of drugs such as cannabis and amphetamines. For example, Expert 11 described that recreational amphetamine users tend to take steps to counter the risks associated with their use. However, Expert 10 described that a fairly high proportion of regular illicit drug users drive within an hour of consuming drugs. In a study she was involved in, a high proportion self-reported that they drove within this time period of consuming drugs.

A number of experts highlighted that the non-recreational use of amphetamines, in particular the use of amphetamines by truck drivers, is more of a road safety concern than recreational use. It was suggested that truck drivers are more likely to drive under the immediate effects of amphetamines and to stay up for long periods of time, and hence be effected by fatigue.

Pharmaceutical drugs

A number of the experts indicated that prescription drugs were a concern to road safety. There were, however, varying perceptions as to the degree of impairment or concern regarding medicines and road safety. Some of the experts showed concern that RDT focuses only on certain illicit drugs, which can, in effect, minimise concern for other drugs. Given the prevalence of people who take prescription medicines and who drive, and the fact that some prescription drugs impair driving ability, some of the experts suggested that prescription drugs can be just as much of a road safety concern as illicit drugs.

E13: ... heavy doses of prescribed drugs would probably impair your driving way more than some of the drugs they are targeting [through RDT].

Antidepressants and things like that actually slow your reaction times down considerably and that's highly dangerous.

E11: People are driving under the influence of prescription drugs as much as people are driving under the influence of cannabis and amphetamines and ecstasy.

While Expert 3 thought that prescription drugs are a road safety concern, she did not feel that they are to the same extent as cannabis and amphetamines, in the sense that their involvement in the culpability statistics is comparatively low.

E3: [Prescription drugs and driving is not] anything like as big of a concern as amphetamines and THC, but yes it is a concern.

However, a number of experts countered this, indicating that benzodiazepines are a particularly concerning drug from a road safety perspective. Expert 8 highlighted that most cases in which benzodiazepines have been implicated in road accidents have involved older drivers who have taken a higher-than-prescribed dosage. Experts described that benzodiazepines, if used in the manner they are prescribed to be used, are not necessarily a road safety concern.

E8: [Benzodiazepines] shouldn't be a major problem, or any problem, on the road ... [unless] they're used in a non-prescribed fashion.

E19: I think it's important that the distinction be made that it is predominantly people that are misusing those types of drugs. They're not using them in accordance with their medical practitioners' instructions.

Expert 9 stated that, because benzodiazepines show up fairly commonly in the systems of fatal accident victims, it does not necessarily mean that benzodiazepines are a significant road safety concern. She suggested that the figures could be in proportion to the amount of benzodiazepine use that occurs in the community and that the benzodiazepines might not be a "determining factor of people having crashes".

Expert 5, however, discussed statistics from general sobriety testing to imply that benzodiazepines and driving is a concern. She suggested that the most common drug that shows up in the blood tests of those intercepted for erratic driving (who have failed the general sobriety test) is benzodiazepines, followed by cannabis.

Experts highlighted that prescribed medicines are complicated from a road safety perspective, being not only prescribed medicine, but that large numbers of people who take them, drive.

E20: But the problem with benzos is that they are a lawful drug, if taken properly. And I imagine that many people take a range of drugs under proper medical supervision, so their sheer presence themselves won't cause an issue.

Polydrug use

Polydrug use was raised by the experts as an issue for drug driving. Impairment research is particularly complicated by the fact that many of those who drug drive have more than one substance in their system. Experts indicated that the typical combinations include an illicit drug and alcohol, a combination of illicit drugs, or an illicit drug and/or alcohol with a prescription or over-the-counter drug.

E8: More than two-thirds of drivers who use recreationally use two or more drugs ... That might include alcohol, it might include two or more illicit drugs, it might include illicit drugs plus benzodiazepines.

Six of the experts commented that polydrug use and driving is particularly concerning from a road safety perspective, because a combination of drugs affects driving performance more so than any one drug alone.

E11: The more you add, the more wasted you are, the more likely you're going to have impaired driving at that time.

It is important to note that one expert felt that polydrug use has not, thus far, been shown to be a significant enough road safety concern to warrant the investment of resources.

E9: I don't think we have great evidence that it's a major road safety issue at the moment. I mean of course it happens ... but I don't think we've got good evidence that it's a major road safety problem worthy of investing huge amounts of money in.

However there were other experts, as described in chapter 3 on prevalence, who do consider polydrug use a significant issue for road safety.

A number of the experts stressed that alcohol remains the drug of most concern from a road safety perspective, whether it be alcohol alone, or alcohol in combination with other drugs. Experts stressed that alcohol is the major drug involved in polydrug use.

E13: Alcohol I think is still the biggest problem. Other drugs are an issue but still I think alcohol is the number one.

While experts expressed concern about combining amphetamines and prescription drugs with alcohol, many of the experts were particularly concerned about cannabis and alcohol use and the subsequent impairment. It was suggested that even a small amount of alcohol (that is, a BAC of less than 0.05) can be dangerous when combined with cannabis.

E7: I think it's pretty conclusive that if you're drinking even a small amount, and I'm talking under about 0.05, and just having some cannabis with that, it can blow your impairment out of the water so to speak.

Experts highlighted that pharmaceutical drugs, when taken according to prescription, are less of a risk to road safety, but nevertheless they are particularly concerning when taken alongside other drugs.

But then we mix it (medicines) with other drugs, and polydrug use, especially with alcohol and other drugs of any type, is a major issue.

Gaps in evidence

Key experts stressed that the area of drug impairment requires significant amounts of research in order to obtain a better understanding of the impairing effects that drugs have on driving. A number of experts suggested that research to date has not been able to conclusively determine how various drugs work in the body and affect functioning. However, they were aware of the difficulties that are inherent to this sort of research.

E13: [With alcohol] if you measure how much is in the breath, that tells you how much is in the blood, which in turn tells you how impaired the person is. With drugs, the level in the blood actually does not have very much relationship to how impaired the person is. We still don't know a lot about exactly how drugs affect behaviour at different levels.

Experts contrasted the limited understanding of drugs and how they affect functioning, with the good understanding of alcohol and how it affects functioning. While the relationship between BAC and functioning is well established, the relationship between concentration of various drugs in the blood and functioning is not well understood. It was suggested that this is the case for individual drug use and polydrug use.

Expert 9 raised the ethical issues inherent in this sort of research: "We can't just give people drugs and say, 'let's see how you perform'". Nevertheless, the experts agreed that further research in this area is crucial.

Summary

Key experts agreed that cannabis and amphetamines are the drugs other than alcohol to have the most impairing effects on driving. They specified that cannabis has a significant impact on judgement and, hence, impairment, while amphetamines lead to increased risk taking and driver fatigue. The experts had mixed views as to the impairing effects of medicines on driving. Experts were mixed in regards to the impairing effects of polydrug use. The drug they considered the most problematic, particularly when mixed with other substances, was alcohol.

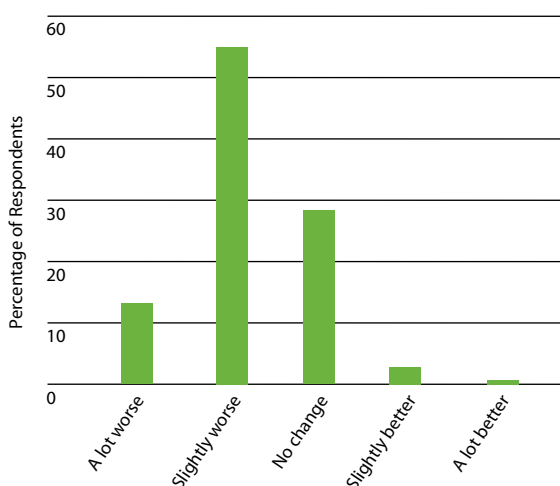
4.3 Perceptions of impairment reported by Internet respondents

The current study sought to ascertain the Internet survey respondents' perceptions of impairment to driving ability following their drug use. The Internet respondents who reported having either driven under the influence of alcohol and/or within three hours of using the drugs under consideration were asked what impact they believed this had on their driving ability the last time they did so.

Alcohol

Of those Internet respondents who reported driving under the influence of alcohol (that is, with a BAC over .05) in the previous 12 months (n=868), over two thirds (68.1 per cent) reported that their driving had been impaired the last time they had done so; over half (54.7 per cent) reporting that it had been "slightly worse" and more than one in 10 (13.4 per cent) reporting that their driving ability had been "a lot worse" (Figure 4.1). More than one quarter (28.5 per cent), however, reported that there had been "no change" in their driving ability the last time they drove with a BAC over .05, and a small proportion reported that their driving ability had been improved.

Figure 4.1: Internet respondents' perceptions of their driving ability last time drove under the influence of alcohol (that is, with a BAC of more than .05) (n=868)



Illicit drugs

The findings in relation to perceived impact of the different types of illicit drugs on driving ability were mixed (see Figure 4.2).

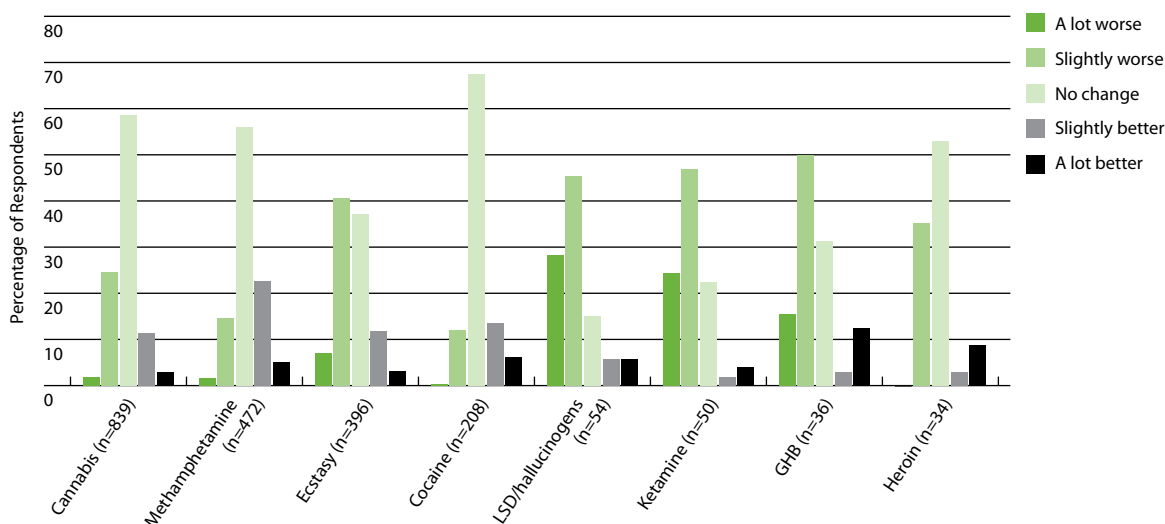
Looking first at the findings in relation to the impact of cannabis on driving ability, over half (59.0 per cent) of the Internet respondents who reported driving within three hours of using cannabis (n=839) reported that there had been “no change” in their driving ability the last time they had done so. Slightly less than one quarter (24.6 per cent), however, reported that their driving ability had been slightly worse the last time they drove after using cannabis.

In general, users of stimulant drugs perceived that there had been little, if any, impact on their driving ability the last time they drove within three hours of use. Of those Internet respondents who reported driving within three hours of using cocaine in the previous 12 months (n=208), over two thirds (67.5 per cent) reported that there had been “no change” in their driving ability the last time they had done so and over half (56.0 per cent) of the Internet respondents who reported driving within three hours of methamphetamine use (n=472) in the previous 12 months reported that the last time they did so, there had been “no change” in their driving ability. Indeed, approximately one quarter of those who drove within three hours of using methamphetamine reported

that their driving ability had been improved the last time they had done so, with 22.5 per cent reporting it had been “slightly better” and 5.0 per cent that it had been “a lot better.” The findings in relation to ecstasy, however, differed to those of the other stimulant-type drugs. While more than one third (37.1 per cent) of ecstasy users reported that there was no change to their driving ability the last time they drove within three hours of ecstasy use, approximately 48.0 per cent reported that it had a negative impact on their driving ability, making it either slightly (40.6 per cent) or a lot (7.8 per cent) worse.

In relation to the less commonly used illicit drugs, over half (52.9 per cent,) of the Internet respondents who reported driving within three hours of heroin use (n=34) in the previous 12 months reported that the last time they did so, there had been “no change” in their driving ability. In comparison, those Internet respondents who reported driving within three hours of using drugs with hallucinogenic and/or dissociative properties such as ketamine (n=50), GHB-type substances (n=36) and LSD/hallucinogens (n=54) in the previous 12 months tended to report that their driving ability had been slightly worse (47.2, 50.2 and 45.3 per cent, respectively) or a lot worse (25.0, 15.2 and 28.5 per cent, respectively) the last time they had done so. However, when considering these findings, the relatively small number of respondents reporting driving following the use of these drugs needs to be considered.

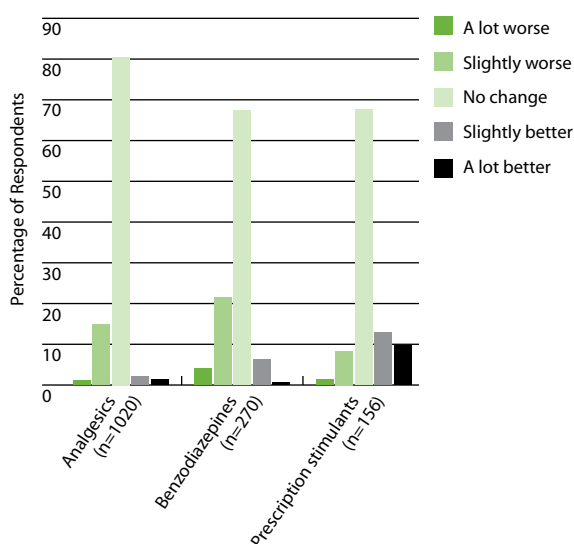
Figure 4.2: Internet respondents’ perceptions of driving ability last time they drove within three hours of illicit drug use



Pharmaceutical drugs

The findings in relation to the perceived impact on driving ability of the three classes of pharmaceutical drugs under consideration were relatively consistent (Figure 4.3). The majority of Internet respondents reported that there had been no change in their driving ability the last time they drove within three hours of using analgesics (80.5 per cent), benzodiazepines (67.4 per cent) and prescription stimulants (67.9 per cent). Slightly more than one quarter of those Internet respondents who reported driving with three hours of using benzodiazepines in the previous 12 months, however, reported that their driving ability had been impaired the last time they had done so, with 21.5 per cent reporting that it was “slightly worse” and 4.1 per cent reporting that it was “a lot worse”. In contrast, approximately one quarter of those Internet respondents who reported driving within three hours of using prescription stimulants reported that their driving ability had been improved the last time they did so, with 12.7 per cent reporting it had been “slightly better” and 9.7 per cent reporting it had been “a lot better”. When interpreting these results it is important to acknowledge the relatively small numbers of respondents reporting driving within three hours of benzodiazepine or prescription stimulant use.

Figure 4.3: Internet respondents’ perceptions of driving ability the last time they drove within three hours of pharmaceutical drug use



4.4 Summary and discussion

There is increasing evidence that drugs, through their impact on cognition, mood and psychomotor functioning, have the potential to impair driving performance.

There is now substantial evidence that alcohol, particularly at BAC levels above .05, impairs driving performance. Indeed, a number of key experts argued that alcohol remains the drug of most concern from a road safety perspective. We found that there appears to be widespread recognition of the impairing effects of alcohol on driving ability, with over two thirds of the Internet respondents who reported driving under the influence of alcohol in the previous 12 months reporting that their driving had been impaired. The majority of drink-drivers are aware of the impairing affects of alcohol on their driving ability, yet continue to drive with BAC of more than .05. Further research examining the factors influencing these decisions and the circumstances around such behaviour will contribute to countermeasures targeting drink-driving behaviour.

Furthermore, more than one quarter of Internet respondents who reported having driven with a BAC of more than .05 in the previous 12 months reported that there had been “no change” in their driving ability, with a small proportion reporting that their driving ability had been improved. These findings indicate that, despite significant mass media education campaigns providing information regarding the impairing effects of alcohol upon driving ability, there remains a sub-group of drink-drivers who do not perceive that their driving ability is impaired when they have a BAC of more than .05. Previous research has found that those caught drink-driving are more likely to be repeat offenders with a history of driving and criminal offences and who do not respond to law enforcement and penalties (Vingilis, 2002). This group presents a significant concern for road safety and challenge for the development of road safety countermeasure efforts. Further research with this sub-group, designed to gain a better understanding of their perceptions and behaviours, will contribute to the development of appropriate, targeted countermeasures.

There is increasing evidence, from culpability and experimental studies, that drugs other than alcohol, in particular cannabis, amphetamines, MDMA/ecstasy and benzodiazepines, impair driving performance and pose risks to road safety. The evidence regarding cannabis-related driving impairment, however, is inconclusive, with some studies suggesting that some drivers may, in effect, compensate for the impairing effects when driving. Key experts also noted the inconsistencies in the existing research but tended to argue that cautious driving does not adequately compensate for impaired judgement and reaction time. Evidence that the perception that cannabis use does not impair driving ability is widespread within the general community is provided by the Internet survey, with over half of those who had driven within three hours of using cannabis reporting that there had been “no change” in their driving ability the last time they had done so. This finding, together with the lack of consensus in the evidence and within the road-safety field, are all indicative of the need for further research into the nature and extent of the impairing effects of cannabis upon driving ability and the need for countermeasures educating cannabis users.

Evidence from culpability studies suggest that amphetamine use is associated with a considerable proportion of road accidents. Some research has previously suggested, however, that it is the “rebound”—withdrawal symptoms, or the ‘comedown’ period—that is of greatest concern. Amphetamines were considered by most key experts to be one of the main drugs of concern regarding road safety. Consistent with the findings of the literature review, however, a number of key experts highlighted complexities and confounding factors regarding dose and timing of amphetamine use and driving ability: first, that at low doses, amphetamines may produce increased alertness and attentiveness, which could potentially improve driving ability; second, that at higher doses amphetamines may be associated with greater risk-taking (including driving) behaviour; and third, that with extensive and sustained use, amphetamines can produce “rebound fatigue.” The complexities regarding the potential effect of amphetamine use on driving ability was reflected in the findings of the Internet survey. Over half of the

Internet respondents who reported driving within three hours of methamphetamine in the previous 12 months reported that the last time they did so there had been “no change” in their driving ability. Indeed, approximately one quarter of those who drove within three hours of using methamphetamine reported that their driving ability had been improved the last time they had done so.

The findings in relation to cocaine were comparable to those regarding methamphetamine, with most respondents perceiving “no change” in their driving ability the last time they drove within three hours of cocaine use. The findings in relation to ecstasy, however, differed from those of the other amphetamine-type drugs. Although slightly more than one third of respondents reported that there had been no change in their driving ability the last time they drove within three hours of ecstasy use, 48.0 per cent reported that it had a negative impact on their driving ability. Thus, the responses of the Internet sample of ecstasy drug drivers reflect the findings of recent research indicating impaired driving ability is associated with MDMA use (Ramaekers et al., 2007). These findings may also reflect the variable content and purity of pills and powder sold as “ecstasy” on the Australian illicit drug market, whereby there is evidence that considerable proportions contain a range of substances, including ketamine (Quinn, Breen & White, 2004). Indeed, this is consistent with the findings that ketamine, GHB-type substances and LSD/hallucinogens were much more likely to be perceived by the Internet survey respondents as having impaired their driving ability the last time they drove within three hours of using these drugs. Such findings are likely to be associated with the hallucinogenic and/or dissociative properties of these drugs.

The relatively small body of previous research examining the impact of pharmaceutical drugs upon driving ability has tended to focus on benzodiazepines, with findings suggesting that the effects are related to dosing and tolerance, and further complicated by the medical benefits that may be associated with the prescription and use of these drugs. The key experts in the present study expressed varying levels of concern regarding the potential impact of pharmaceutical drug use upon road

safety and little consensus regarding the level of impairment to driving ability associated with the use of this broad category of drugs. It was noted, however, given that the prevalence of use in the general population is high, there is considerable potential for harm.

Consistent with the findings from the literature review, key experts also noted that the effects of such drugs are dependent on dose consumed as well as whether they are being used as prescribed. While key experts expressed a range of views as to the impairing effects of pharmaceutical drugs in general, a number reported that benzodiazepines pose a significant risk to road safety. The findings of the Internet survey suggest that pharmaceutical drug users tend to perceive that their driving ability tends not to be negatively affected when they drive within three hours of using them. This was not always the case, however, with some benzodiazepine users reporting their driving ability had been negatively affected and some prescription stimulant users reporting that their driving ability had been improved the last time they drove with three hours of use of these drugs. These findings need to be interpreted with caution due to the relatively small number of respondents. Further, no information was collected regarding dose and the categories asked about encompass a diverse range of drugs. While we did specify specific examples of the more impairing types of the different pharmaceutical drugs, we cannot be assured that respondents responded in relation to these, as opposed to the less impairing types of the drugs. For example, in the case of the analgesics categories, some have a considerable potential to impact driving ability (for example, codeine and or opiate-based drugs), while others have minimal or no impairing effect (for example, paracetamol).

Clearly, pharmaceutical drugs are a very complex issue from a road safety perspective. Not only is there a huge

variety of classes of pharmaceutical drugs, with differing levels of potential for impairment, but there are issues around patterns of use (for example, whether taken according to a therapeutic dose) and the impact of pre-existing medical conditions. These are all areas in need of further research, to enable clear information to be provided to drivers.

Finally, there is increasing evidence polydrug use may be associated with a greater degree of impairment than that associated with single drug types, with the most impairing combinations being alcohol and cannabis, and alcohol and benzodiazepines. Similarly, although the key experts expressed diverse opinions regarding the importance of polydrug use and driving to road safety, they did acknowledge that there is increasing evidence to suggest that there are certain combinations of drugs that cause significantly greater impairment to driving ability, including alcohol with either cannabis or benzodiazepines. This is clearly an immensely complicated area but is certainly one that warrants further investigation.

As the above summary illustrates, drug use and driving performance is not a straightforward issue. Impairment is dependent on a range of factors including the quantity of drug consumed, the time between ingestion and time of driving, as well individual variability, such as level of tolerance and any pre-existing health condition. Although the Internet survey component of the present research collected valuable information regarding respondents' subjective perceptions of impairment, it was not able to take into account the wide range of confounding factors. Future research addressing these factors is needed to further inform the development of credible information and countermeasures for drug-using drivers.

5

Risk perceptions, knowledge and understanding of drug driving

5.1 Literature

Much of the existing literature on drug driving, both locally and internationally, has focused on the prevalence and impairment aspects of drug driving (Kelly, Darke & Ross, 2004). However, it is also important that the perceptions and attitudes of the general population in relation to drug driving are understood. Attitudes and perceptions, in particular perceptions of risk, have previously been found to be strong predictors of behaviour and are, therefore, key aspects of any attempt to achieve behavioural change (Slovic, 1987). Understanding perceptions of risk that drivers attach to drug driving, as well as their knowledge and understanding of how drugs affect driving, should be central to efforts to develop effective drug-driving countermeasures.

It is important to note that risk perception is inherently subjective (Slovic, 1992), with the way individuals perceive risk and make decisions about their own behaviour not always matching objective assessments of risk (Calman, 1996). The perception of risk involves the beliefs, judgements, feelings and values that individuals hold towards specific events or behaviours (Pidgeon, Hood, Jones, Turner & Gibson 1992). Given the gap that can exist between objective risk and an individual's perceived risk (Slovic, 1987), ongoing assessment of public perceptions and attitudes regarding drug driving should be conducted. This information can be used to determine the effectiveness of road-safety campaigns and to highlight areas where more work is needed and/or changes can usefully be made.

A small number of studies have examined attitudes and perceptions towards drug driving. Although a few have examined general population attitudes, research has tended to focus on the attitudes and perceptions of specific populations of illicit drug users.

The small body of evidence regarding the Australian general populations' perceptions of drug driving suggests that drug driving is typically perceived as a dangerous and unacceptable behaviour (Sweeney Research, 2005). The 2005 AAMI Crash Index report, for which 2381 telephone interviews were conducted with licensed car drivers aged 18 and over, found that the majority (69 per cent) of respondents perceived drug driving (defined as driving after using drugs such as cannabis, cocaine, speed or ecstasy) as more dangerous than drink driving (Sweeney Research, 2005). Similarly, McLeod et al. (1998) found that the majority of participants in their study of Western Australian residents (n=815) were against the use of illicit drugs while driving. In comparison, opinions and knowledge regarding pharmaceutical drug use and driving varied. For instance, only a small proportion (10 per cent) perceived driving while using sedatives to be unproblematic, compared with more than one third (35 per cent) who deemed driving under the influence of painkillers to be unproblematic (McLeod, 1998). Such findings may be influenced by the fact that most respondents are likely to have had some personal experience of widely used painkillers (for example, paracetamol) and thus are likely to be aware of their limited psychoactive potential.

Research examining risk perceptions within drug-using populations have recruited samples of cannabis, amphetamine and opiate users, as well as drug-using populations more generally. When considering the findings of these studies it is important to note that there has been considerable variability in the definition of "drug user" across the studies, from any use in the previous 12 months to daily use.

Studies with cannabis users have found that, although users report effects such as compensated reaction time, restricted vision and pessimistic distance perception,

they perceive that it is safe to drive following cannabis use and that it does not increase accident risk (Aitken, Kerger & Crofts, 2000; Davey, Davey & Obst, 2005; Lenné, Fry, Dietze & Rumbold, 2001; Neale, 2001). In a Victorian study, daily cannabis users reported that, although they would not hesitate to smoke cannabis and drive, they would be less likely to drive after consuming a combination of cannabis and alcohol (Lenné et al., 2001).

Indeed, the evidence suggests that within populations of illicit drug users, perceptions of driving under the influence of alcohol are relatively consistent, with participants tending to report that it could adversely affect their driving ability (Donald, Pointer & Weekley, 2006). Further, in comparison to the perceived benefits that amphetamine use may have upon driving ability, Aitken, Kerger & Crofts's (2000) sample of amphetamine users identified alcohol as the most dangerous substance under which influence to drive.

Summary

Only a very small amount of previous research has examined perceptions of risk associated with drug driving. Further, no prior research has examined level of knowledge and understanding of the effect that drugs have on driving, either within the general population or among groups of illicit drug users. The available evidence suggests that, within the general Australian population, drink driving and illicit drug driving are considered as dangerous, unacceptable behaviours. Perceptions of risk attached to driving and pharmaceutical drug use by the general community are, however, varied. In comparison, the small body of research regarding illicit drug users' perceptions of risk suggest that many consider alcohol, either consumed alone or in combination with illicit drugs, to be associated with greater risk than illicit drugs used alone. Indeed, evidence suggests that many illicit drug users do not consider their drug use to increase their driving-related risk.

5.2 Key expert interviews

Key experts raised a number of issues around perceptions and attitudes towards drug driving, including how important it is for us to understand the community's attitudes towards drug driving in order to

inform the development of effective countermeasures. Experts discussed attitudes and perceptions in relation to illicit drugs as well as towards pharmaceutical drugs and driving.

Perceptions of illicit drugs

Experts suggested that, in general, people tend to acknowledge that drug driving is dangerous, or has the potential to be so. Expert 1, for instance, commented that "everyone regards [drug driving] as a risky thing to do". He went on to suggest that even those who are quite accepting of drug use believe that drug driving is unacceptable, because unlike drug use itself, drug driving has the potential to harm others.

E1: Most people say, "what you do in your own private time is your business ... but when you get behind the wheel of a car you're putting other people in jeopardy", and I think people are very anti [against] that.

Key experts stated that attitudes towards drugs are influenced by the experience a person has of drug use in general, as well as experience of drug driving. For example: "personal experience always effects attitudes" (E18). Expert 13 indicated that the inexperienced tended to over estimate the dangers associated with drug driving while the drug experienced underestimated the dangers. She suggested that neither have an accurate idea of the dangers: "The truth is probably somewhere between those two" (E13).

Expert 5 suggested that those with little drug experience tended to hold the general opinion that drug driving is highly dangerous because they have not had experience that tells them otherwise. It was suggested that their fearful attitudes are guided in part, or significantly, by sensationalised media reporting.

E2: I think ... members of the general public who watch "Today Tonight" [television current affairs program] ... are generally fearful of illicit drugs full stop ... [and] totally against driving whilst impaired with illicit drugs.

Expert 8 suggested that moralistic judgements inform peoples attitudes, in particular the drug inexperienced,

who assume that drug driving is more dangerous than drink driving.

Age was raised as an important factor, with experts indicating that younger people are more likely to have first- or second-hand drug experience, while older people have less, if any, drug experience; for example: “Drug driving opinions vary greatly across age groups” (E8). E20 highlighted that the diverse views in the community tend to be related to age, with young people predominantly taking illicit drugs and older people taking pharmaceutical drugs.

E20: I think that there’s two diverse views. I think that some young people are probably using drugs more frequently than the older group, who do not see the dangers associated with it. Whereas on the other side you get older people who have a totally different view of it ... benzos impact on older people more so than the younger group who are using drugs such as cannabis and ecstasy.

A number of experts stated that individuals with more drug experience are less inclined to assume that all “types” of drug driving are dangerous. It was suggested that through their experience they consider the dangers associated with drug driving in terms of a range of factors, including drug/s used and the amount of time between consumption and driving. Moreover, a number of the experts suggested that, in contrast to the drug inexperienced, many of those with drug experience feel that the effects of alcohol are more impairing to driving ability than the effects of some other drugs.

Many of the experts discussed at length the attitudes and rationale of the drug experienced to drug driving. First, a number of experts indicated that it is a common perception among those with drug experience that cannabis and/or methamphetamines do not significantly impair driving ability. In fact, a number of the experts suggested that some drug users believe that cannabis and methamphetamine use improves driving ability. Expert 10 indicated that a high proportion of drug users report that cannabis improves their driving ability by making them drive slower and more cautiously, while methamphetamines improves their driving ability by making them more alert and focused.

Expert 10 went on to suggest these individuals are rarely confronted with any significant negative consequences from drug driving, as those who have driven under the influence of these drugs, or who know of a friend who has, have done so without experiencing a negative consequence.

E10: [Young people] are less likely [than older people] to be concerned about [drug driving] ... because they’ve actually done it or been with someone who’s been on drugs whilst driving and understand that nothing has happened to them.

Second, a number of the experts raised that drug users perceive that they are experienced enough to be able to take appropriate measures to reduce the risks associated with drug driving, such as waiting sufficient time after drug consumption to reduce the likelihood that their driving ability will be significantly impaired.

E10: Most people understand the dangers [associated with drug driving] and will take some precautions to make sure that they’ve come down to a state where they feel that they or their friend is safe to drive. A lot of people do encourage going to sleep before driving and things like that.

A number of the experts were concerned by a common misconception among cannabis users that they can compensate for the impairing effects of the drug.

E20: I think a lot of people think that if they smoke cannabis they drive slower, they’re more careful and they have less accidents.

E19: There’s a popular misconception that people that use cannabis are better drivers—that they’re more relaxed and they drive slower. There’s no understanding of the degradation of the psychomotor skills, coordination, balance, all those type of things. They just think, “Well, if I slow down, then I’m safer.” They just don’t understand what the effects of those drugs on them are, and how that relates to their ability to drive a car safely.

Experts discussed that there can also be a perception among regular drug users that the development of

tolerance towards a drug can reduce the impairing effects of drugs on driving. For example, Expert 10 described that people who regularly take illicit drugs, and have done so for some time, believe that they have built up a tolerance to the drug and that their driving ability is not impaired—at least not to the extent of someone with less drug experience.

E10: There is the attitude that “I’m used to it, this is how I manage it, and it works ... level of impairment for me is not the same as for someone who doesn’t use very much”.

Finally, experts raised that many people drug drive, or take a lift with someone who has taken drugs, not because they are not aware of the risks, but because they are either willing to take the risk or feel invincible. Expert 1 indicated that these people find the sense of danger about drug driving appealing. Expert 16 felt that young peoples’ preparedness to drug drive can stem from the perception of invincibility, particularly common to young people; “the perception is that ‘Well, it’s not going to have any effect on me’.” (E16).

Experts expressed concern that people are basing their perceptions about drug driving on their personal experiences. They suggested that experiences and attitudes that are out of line with “the facts” can lead people to take risks that they do not even know they are taking. For example, Expert 15 commented that people with fatigue might take amphetamines thinking that they are improving their driving ability by making themselves more alert. However, the relationship between amphetamines and driving ability is not as straightforward as this, and the amphetamines may in fact make their driving worse.

E15: A fear of ours is that people stay up all night partying, have a line [of amphetamines] before they ... drive home to wake them up, which is not necessarily a good solution.

Experts also raised concern about misunderstanding of polydrug use. For example, Expert 15 suggested that even those quite knowledgeable about specific drugs, such as alcohol and cannabis, have a poor understanding of the combined effect; in particular that

the effect is greater than the effect of either of the drugs taken on their own.

E15: People don’t factor in cannabis and alcohol. They feel they’ve only had two drinks, “I’m right to drive”, when in actual fact they have an interaction with each other than can really impair your driving.

Experts raised that the general public is not well informed about drug driving, and that clearly there needs to be concerted effort to inform the public about drugs and driving. For example, Expert 12 pointed out that there have not been any information or education campaigns to inform the public about drug driving, meaning that people are currently not well informed. It was raised that there needs to be more done to inform the public. For example, Expert 5 suggested that young people need to be informed that their experiences may not be completely reliable and trustworthy, and that their experiences may cause them to underestimate the risks involved. She went on to stress that young people would welcome factual information and that this information needs to be credible and not sensationalised.

E5: I think their attitude is, “You haven’t given me enough information and you haven’t convinced me enough that what I’m doing is actually a road safety issue” ... I think people want facts more than theories.

In sum, in relation to illicit drugs, some experts saw the value in understanding particular sub-populations’ perceptions of drug driving, while others stressed the importance of understanding the general community’s attitudes and perceptions.

E7: It would help to know what public opinion is and what perception is out in the community ... to enable you to decide the most appropriate strategies.

E5: It’s important to know who are the people who are drug driving and what are their attitudes towards it? They’re really the people whose behaviours we need to be changing.

Pharmaceutical drugs

Attitudes towards licit drugs other than alcohol were discussed by experts. While differences were described between experienced and inexperienced drug users in relation to illicit drugs, it was suggested that everyone under estimates the dangers associated with driving while affected by medicines.

E6: I don't think the general public is aware of the ramifications of medications on their driving as perhaps they should or could be.

Some of the experts discussed that some sectors of society are hypocritical in their opinions of "drug" driving. For example, those critical of illicit drug users driving may themselves drive while affected by prescription drugs or over-the-counter medications, which could be as impairing as some illicit drugs.

E15: Someone who is using a prescribed benzodiazepine and driving, don't see that as risky ... when in actual fact they could be the same.

It was suggested that people conceive "drug" driving as meaning driving under the influence of illicit drugs. In addition, Expert 3 commented that people have a "not me" attitude towards drug driving.

E2: I think part of the public that are opposed to illicit drugs have yet to make the realisation that a drug is a drug ... regardless of its legal status.

Despite this, Expert 3 commented that people are ignorant of the fact that medications can significantly impair driving ability. She went on to say that she does not think this is a concerning enough problem to warrant the investment of time and resources.

E3: I don't think the general public would have any idea of the contribution of prescription medicine to driving. And I don't know necessarily whether it is a big enough problem to have a really big focus on.

5.3 Risk perception, knowledge and understanding of drug effects on driving

Internet respondents were asked about their perceptions of risk associated with driving under the influence of a range of licit and illicit drugs. The perceptions of the sample as a whole were examined and a comparison made of the perceptions of risk for users and non users for each of the drugs. The findings regarding alcohol, illicit and pharmaceutical drugs are presented below.

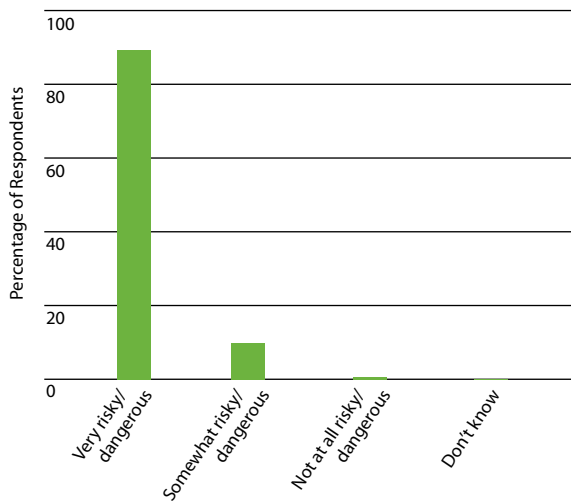
In addition to ascertaining perceptions of risk, Internet respondents were asked how they would rate their knowledge in relation to each of the drugs on driving ability, as well as how long after consuming each of the drugs under consideration it would be safe to drive. The findings pertaining to these questions are presented in the second half of this section.

Risk perceptions

The Internet survey respondents who reported having driven in the previous 12 months (n=6801) were asked about the degree of perceived risk (in terms of driving ability) they attributed to a range of drugs, including alcohol, illicit drugs and pharmaceutical drugs.

The vast majority of respondents (89.3 per cent; n=6331) reported that driving under the influence of alcohol, defined as a BAC of .05 or more, is very risky or dangerous (Figure 5.1). In comparison, less than one in 10 respondents (9.9 per cent; n=676) reported that driving under the influence of alcohol is somewhat risky or dangerous, and only 0.6 per cent (n=44) considered it to be not at all risky or dangerous. Only a very small proportion (0.1 per cent; n=8) of respondents indicated that they did not know how risky or dangerous it is to drive under the influence.

Figure 5.1: Perceptions of risk/danger associated with driving under the influence of alcohol (n=6081)

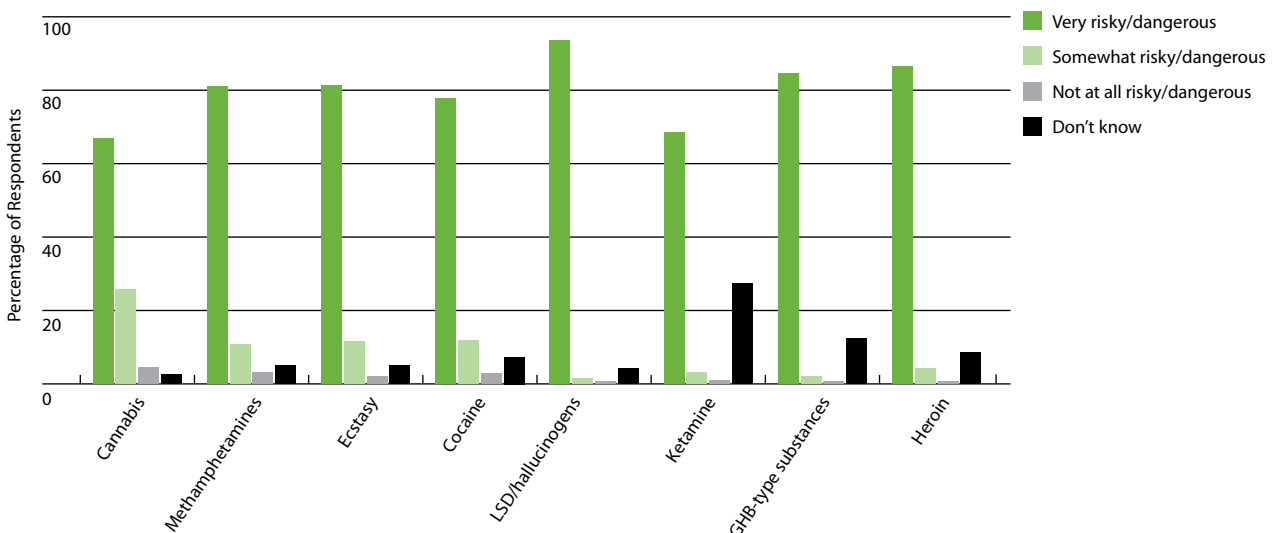


The majority of the sample (n=6081) perceived that driving under the influence of each of the illicit drugs was very risky or dangerous (Figure 5.2). LSD/hallucinogens (93.5 per cent; n=6650), heroin (86.4 per cent; n=5877) and GHB-type substances (84.5 per cent; n=5748) were the drugs most likely to be perceived as very risky or dangerous. Cannabis was the illicit drug least likely to be perceived as very risky or dangerous, although two-thirds (67 per cent; n=4736) of Internet respondents believed it to be so. Indeed, cannabis was

the drug most likely to be considered somewhat risky or dangerous (26 per cent; n=1762) or not at all risky or dangerous (4.5 per cent; n=308) for driving. These findings should be considered within the context of considerable proportions of Internet respondents reporting they did not know the level of risk associated with driving under the influence of lower prevalence drugs, such as ketamine (27.3 per cent; n=1854), GHB-type substances (12.5 per cent; n=852) and heroin (8.5 per cent; n=576).

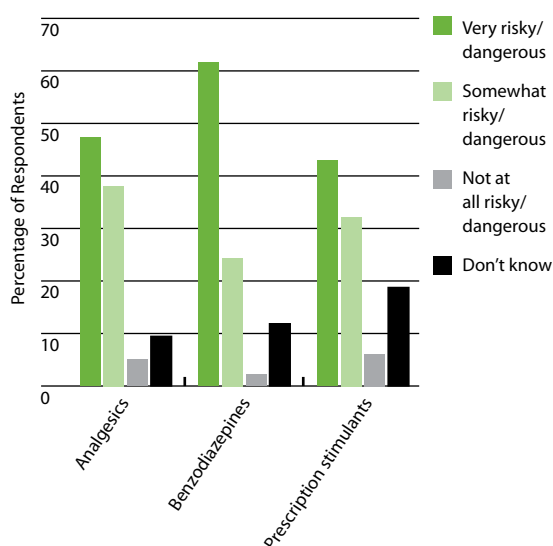
In comparison to the relatively high levels of risk or danger perceived to be associated with driving under the influence of alcohol and illicit drugs, pharmaceutical drugs were less likely to be perceived by the Internet respondents as being very risky or dangerous for driving (Figure 5.3). Of the pharmaceutical drugs respondents were asked about, benzodiazepines (that is, Valium, Serapax, Temazepam) were the most likely to be perceived as very risky or dangerous to drive under the influence of (61.6 per cent; n=4188). Less than half of the respondents reported that analgesics (that is, morphine, codeine: 47.3 per cent; n=3219) and prescription stimulants (that is, Ritalin, dexamphetamine: 43.0 per cent; n=2926) were very risky or dangerous to drive under the influence of. Considerable proportions of respondents perceived driving under the influence of analgesics (36.1 per cent; n=2589), prescription

Figure 5.2: Perceptions of risk/danger associated with driving under the influence of illicit drugs (n=6801)



stimulants (32.2 per cent; n=2187) and benzodiazepines (24.5 per cent; n=1658) to be somewhat risky or dangerous. Again, when considering these findings it is important to note that considerable proportions of the Internet respondents stated that they did not know the level of risk associated with prescription stimulants (18.8 per cent; n=1276), benzodiazepines (12.0 per cent; n=806) and analgesics (9.5 per cent; n=648).

Figure 5.3: Perceptions of risk/danger associated with driving under the influence of prescription drugs (n=6801)



Risk perceptions of users versus non-users

Given the findings of previous research indicating that perceptions of risk of driving under the influence of a range of drugs differ according to personal drug experience, it was of interest to compare the driving-related risk perceptions of participants who reported using substances in the previous 12 months with those who did not. The proportions of users and non-users of each of the drugs who reported driving under the influence as being very risky or dangerous is presented in Table 5.1

Table 5.1: Risk perceptions of users versus non-users

Drug	Non-users very risky / dangerous (%)	Users very risky / dangerous (%)
Alcohol	94.0	88.9
Cannabis	78.6	30.0
Methamphetamine	88.6	31.0
Ecstasy	87.6	46.0
Cocaine	83.0	26.0
LSD/hallucinogens	94.0	88.4
Ketamine	68.1	80.3
GHB-type substances	84.7	76.5
Prescription stimulants	44.5	18.5
Benzodiazepines	64.2	44.4
Analgesics	56.0	30.4

Although the majority of both “drinkers” (n=6231) and “non-drinkers” (n=570) perceived driving under the influence of alcohol to be very risky/dangerous, a significantly higher proportion of the “non-drinkers” reported this to be the case (94.0 per cent) than did “drinkers” (88.9 per cent), with “drinkers” more likely to report it as somewhat risky/dangerous than “non-drinkers” (10.5 per cent and 4.2 per cent, respectively; $\chi^2(2, 6799) = 34.0, p < 0.001$).

The findings in relation to cannabis and stimulant drugs (that is, methamphetamine, ecstasy and cocaine) indicate considerable differences in perceptions of risk of users and non-users. In terms of cannabis, a significantly larger proportion of “non-cannabis-users” (n=5166) reported driving under the influence of cannabis to be very risky or dangerous than “cannabis-users” (n=1635; 78.6 per cent and 30.0 per cent, respectively), with “cannabis-users” more likely to perceive driving under the influence of cannabis as not at all risky than “non-cannabis-users” (14.7 per cent and 1.3 per cent, respectively; $\chi^2(2, 6799) = 1657.67, p < 0.001$). Similarly, a significantly larger proportion of “non-methamphetamine-users” (n=5906) reported driving under the influence of methamphetamine to be very risky or dangerous than “methamphetamine-users” (n=895; 88.6 per cent and 31.0 per cent, respectively), with “methamphetamine-users” more likely to perceive driving under the influence of

methamphetamine as not at all risky than “non-methamphetamine-users” (18.0 per cent and 1.10 per cent, respectively; χ^2 (3, 6798)=2508.35, $p<0.001$). In terms of cocaine, a significantly larger proportion of “non-cocaine-users” (n=6179) reported driving under the influence of cocaine to be very risky or dangerous than “cocaine-users” (n=622; 83.0 per cent and 26.0 per cent, respectively), with “cocaine-users” more likely to perceive driving under the influence of cocaine as not at all risky than “non-cocaine-users” (19.1 per cent and 1.2 per cent, respectively; χ^2 (3, 6798)=1895.57, $p<0.001$). The findings were also comparable for ecstasy, with a significantly larger proportion of “non-ecstasy-users” (n=5744) reporting driving under the influence of ecstasy to be very risky or dangerous than “ecstasy-users” (n=1057; 87.6 per cent and 46.0 per cent, respectively), with “ecstasy-users” more likely to perceive driving under the influence of ecstasy as not at all risky than “non-ecstasy-users” (8.3 per cent and 1.0%, respectively; χ^2 (3, 6798)=1680.23, $p<0.001$).

The findings in relation to LSD/hallucinogens and GHB-type substances were comparable to alcohol, with the majority of both “users” and “non-users” reporting that driving under the influence of these drugs is very risky or dangerous. A significantly larger proportion of “non-LSD/hallucinogens-users” (n=6433), however, reported driving under the influence of LSD/hallucinogens to be very risky or dangerous than “LSD/hallucinogens-users” (n=338; 94.0 per cent and 88.4 per cent, respectively), with “LSD/hallucinogens-users” more likely to perceive driving under the influence of LSD/hallucinogens as somewhat risky or dangerous than “non-LSD/hallucinogens-users” (7.0 per cent and 1.2 per cent, respectively; χ^2 (3, 6798)=69.01, $p<0.001$). Similarly, a significantly larger proportion of “non-GHB-type substance-users” (n=6662), reported driving under the influence of GHB-type substances to be very risky or dangerous than “GHB-type substance-users” (n=88; 84.7 per cent and 76.5 per cent, respectively), with “GHB-type substance-users” more likely to perceive driving under the influence of GHB-type substances as somewhat risky or dangerous than “non-GHB-type substance-users” (15.7 per cent and 2.0 per cent, respectively; χ^2 (3, 6798)=155.71, $p<0.001$).

The findings in relation to ketamine are less consistent. Although the majority of both “users” and “non-users” reported driving under the influence of ketamine to be “very risky/dangerous”, a significantly larger proportion of “ketamine-users” (n=265) reported driving under the influence of ketamine to be very risky or dangerous than “non-ketamine-users” (n=6543; 80.3 per cent and 68.1 per cent, respectively). “Ketamine-users” were, however, more likely to perceive driving under the influence of ketamine as somewhat risky or dangerous than “non-ketamine-users” (12.3 per cent and 2.7 per cent, respectively; χ^2 (3, 6798) =135.45, $p<0.001$). These findings may be attributed to the large proportion of “non-ketamine-users” responding “don’t know” to this question (28.2 per cent), as well as to the dissociative and psychedelic properties of the drug (which users would have experienced) that may increase the perception of risk associated with driving under the influence of ketamine.

Finally, the perceptions of risk attributed to driving under the influence of pharmaceutical drugs of “users” and “non-users” were compared. In terms of prescription stimulants, a significantly larger proportion of “non-prescription stimulants-users” (n=6442) reported driving under the influence of prescription stimulants to be very risky or dangerous than “prescription stimulants-users” (n=359; 44.5 per cent and 18.5 per cent, respectively), with “prescription stimulants-users” more likely to perceive driving under the influence of prescription stimulants as “not at all risky” than “non-prescription stimulants-users” (28.7 per cent and 4.9 per cent, respectively; χ^2 (3, 6798)=382.45, $p<0.001$). For benzodiazepines, a significantly larger proportion of “non-benzodiazepines-users” (n=5910) reported driving under the influence of benzodiazepines to be very risky or dangerous than “benzodiazepines-users” (n=891; 64.2 per cent and 44.4 per cent, respectively), with “benzodiazepines-users” more likely to perceive driving under the influence of benzodiazepines as not at all risky than “non-benzodiazepines-users” (7.5 per cent and 1.4 per cent, respectively; χ^2 (3, 6798)=431.971, $p<0.001$). Lastly, a significantly larger proportion of “non-analgesics-users” (n=4539) reported driving under the influence of analgesics to be “very risky or dangerous” than “analgesics-users” (n=2262; 56.0 per cent and 30.4 per

cent, respectively), with “analgesics-users” more likely to perceive driving under the influence of analgesics as “not at all risky” than “non-analgesics-users” (8.4 per cent and 3.4 per cent, respectively; $\chi^2(3, 9798)=698.41, p<0.001$).

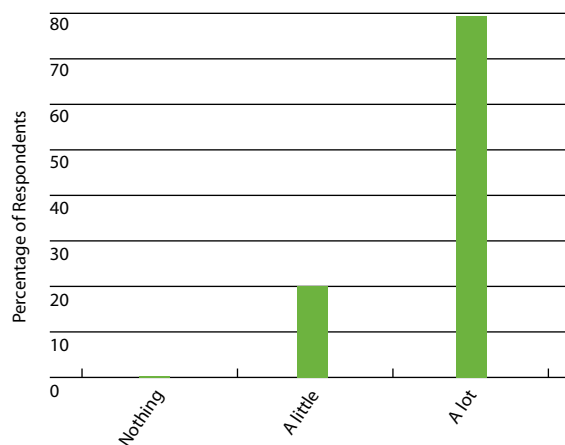
Summary of risk perceptions of users versus non-users

This data suggests that individuals who have used specific drugs are less likely to consider driving under the influence of them to be risky or dangerous. The differences in perceptions of risk of “users” and “non-users” were most marked in relation to cannabis, methamphetamine, cocaine and, to a lesser extent, ecstasy. Further, although the majority of both alcohol and LSD “users” and “non-users” reported that driving under the influence of these two drugs is very risky or dangerous, the trend in differences between the two groups remained consistent, with “non users” more likely to perceive driving under the influence as very risky or dangerous and “users” as somewhat risky or dangerous. The different pattern found for ketamine may be attributed to the large proportion of “non-ketamine-users” responding “don’t know” to this question (28.2 per cent), as well as to the dissociative and psychedelic properties of the drug (which users would have experienced) that may increase the perception of risk associated with driving under the influence of ketamine. The trend identified for the majority of illicit drugs was also consistent in terms of pharmaceutical drugs, with “users” of the three categories under consideration more likely to perceive driving under the influence to be “not at all risky or dangerous” than “non-users”; who, in turn, were more likely to consider driving under the influence to be “very risky or dangerous”.

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

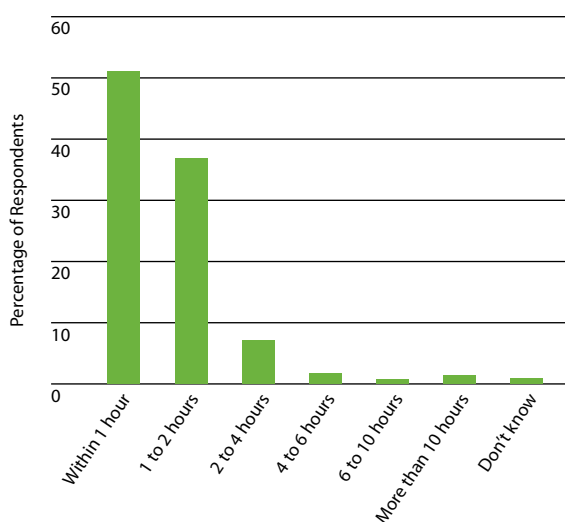
It was of interest to explore how much the Internet respondents perceived they knew in relation to drug use and driving. The findings indicate relatively high levels of knowledge in relation to alcohol and driving, with the vast majority (79.5 per cent; n=5401) reporting that they knew a lot, less than a quarter (20.1 per cent; n=1370) reporting they knew a little and only 0.5 per cent (n=30) reporting they knew nothing (Figure 5.4) regarding the effect of alcohol on driving ability.

Figure 5.4: Levels of knowledge regarding the effect of alcohol on driving ability (n=6801)



Just over half (51.0 per cent; n=3470) reported that it would be safe to drive within one hour of consuming one standard drink of alcohol, more than one third (37.0 per cent; n=2509) nominating one to two hours (Figure 5.5). Smaller proportions of respondents reported that longer periods of time would need to elapse between drinking one standard drink and driving: two to four hours (7.2 per cent; n=492), four to six hours (1.8 per cent; n=130), six to 10 hours (0.7 per cent; n=52) and more than 10 hours (1.7 per cent; n=117). Only a small proportion of the Internet respondents (1.0 per cent; n=65) indicated they did not know how long after consuming alcohol it would be safe to drive.

Figure 5.5: Time required between consumption of one standard drink and “safe” driving (n=6801)



The responses of the Internet participants to the questions asking how much they knew about the effects of each of the illicit drugs on driving ability indicate generally very low levels of knowledge (Figure 5.6). With the exception of cannabis, more than two thirds of respondents reported that they knew either nothing or a little. In relation to cannabis, more than half (51.1 per cent; n=3477) reported that they knew a little and more than one third (33.2 per cent; n=2258) that they knew a lot.

In relation to perception of time necessary between consumption and it being safe to drive, the responses in

relation to the illicit drugs were also markedly different to those relating to alcohol. With the exception of cannabis, more than one third of respondents reported that it would be necessary to wait more than 10 hours after consuming all types of illicit drugs under consideration before driving (Figure 5.7). Further, again with the exception of cannabis, more than one third of respondents reported that they did not know how long after consuming each of the drugs it would be safe to drive.

As noted, the findings in relation to cannabis differed to the other categories of illicit drugs. Approximately one

Figure 5.6: Levels of knowledge regarding the effect of illicit drugs on driving ability (n=6801)

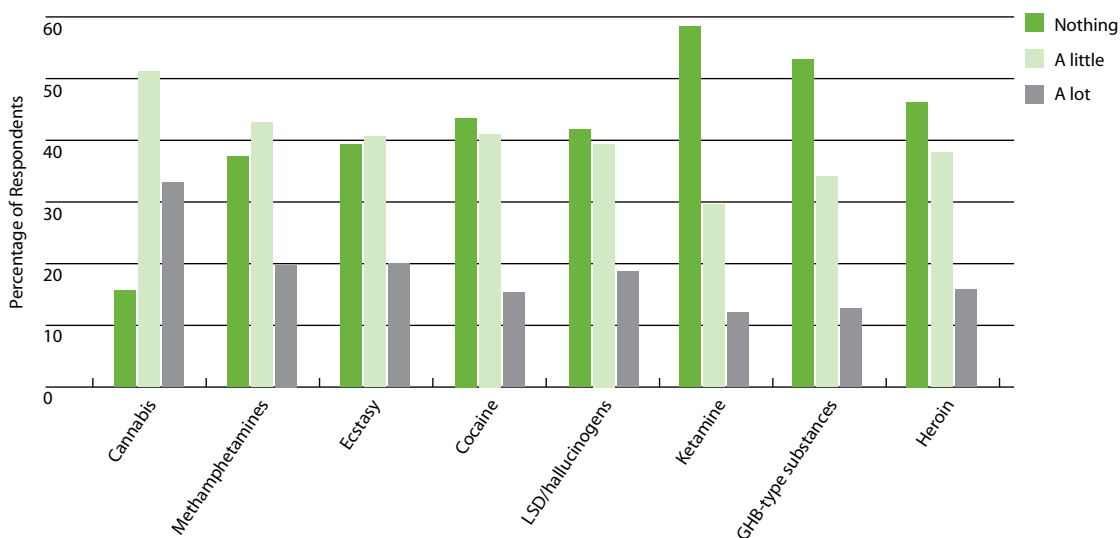
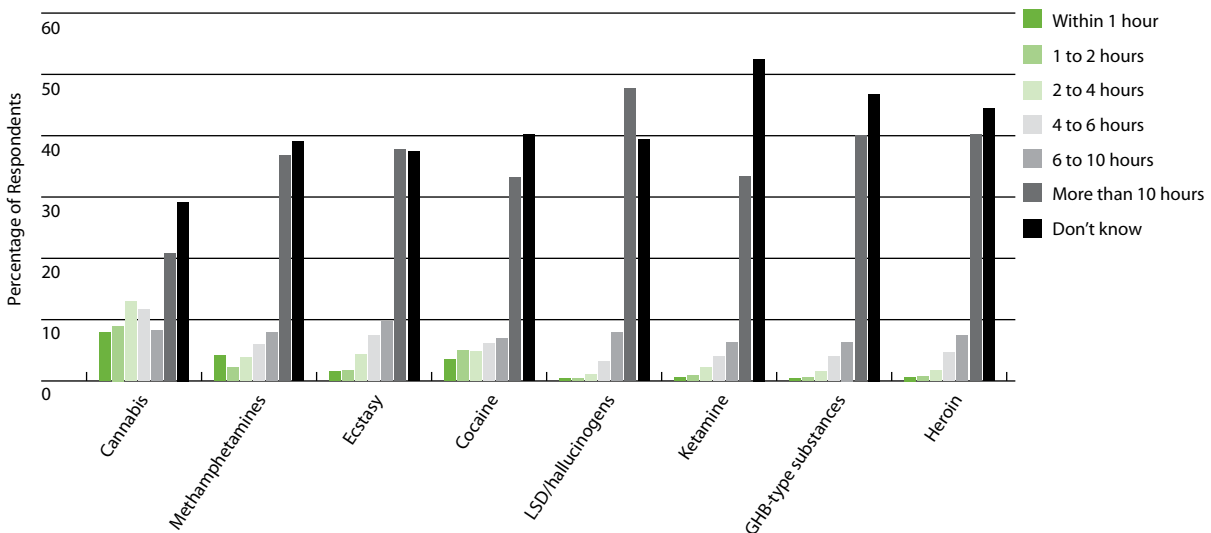
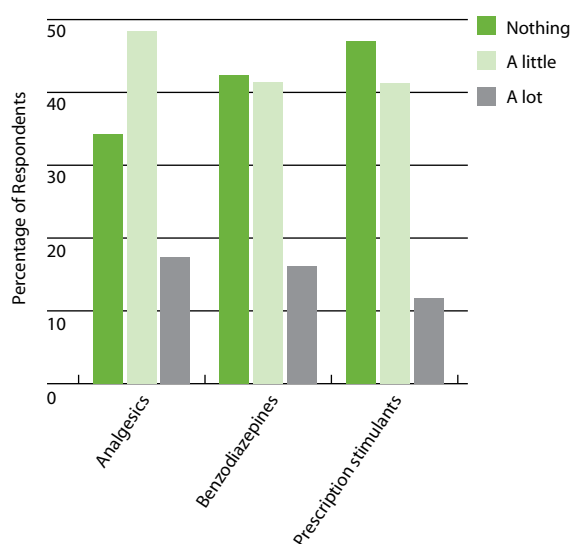


Figure 5.7: Time required between consumption of illicit drugs and “safe” driving (n=6801)



in 10 Internet respondents reported that it would be safe to drive within one hour (8 per cent; n=542), one to two hours (9 per cent; n=613), two to four hours (13.0 per cent; n=885), four to six hours (11.7 per cent; n=794) and six to 10 hours (8.2 per cent; n=560) after using cannabis. Less than one quarter of the respondents (21.0 per cent; n=1418) reported that it would be necessary to wait more than 10 hours to drive after using cannabis and more than one quarter (29.2 per cent; n=1989) were unable to specify a time frame.

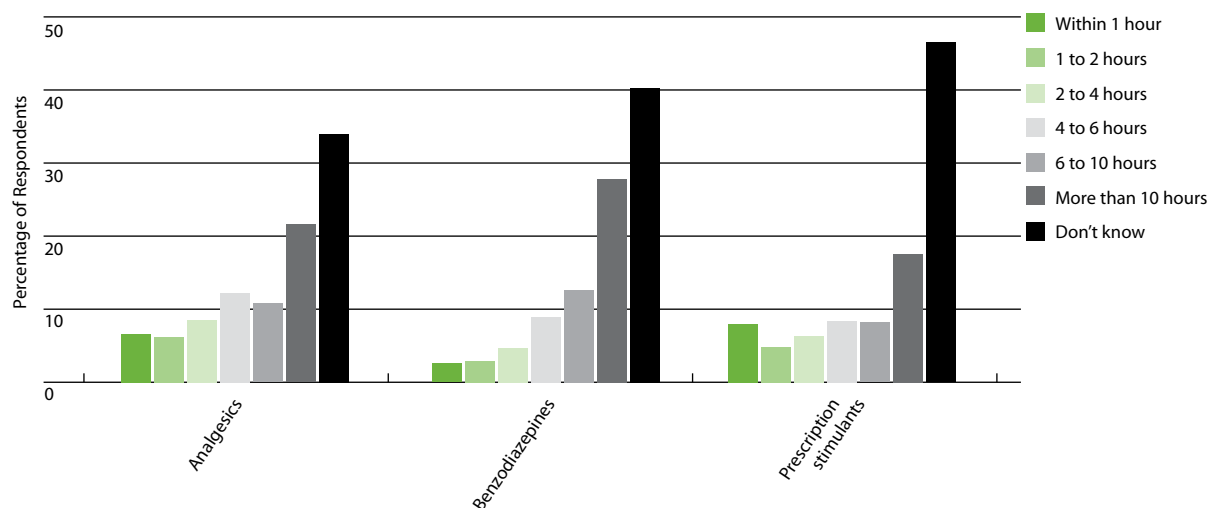
Figure 5.8: Levels of knowledge regarding the effect of prescription drugs on driving ability (n=6801)



The responses of the Internet participants to the questions asking how much they knew about the effects of each of the pharmaceutical drugs on driving ability indicate generally very low levels of knowledge (Figure 5.8). Between more than one third and less than half of the respondents reported that they knew nothing: analgesics (34.2 per cent; n=2329), benzodiazepines (42.2 per cent; n=2887) and prescription stimulants (47.0 per cent; n= 3196), and of those respondents who reported knowing about the effects of prescription drugs on driving ability, most reported knowing only a little: analgesics (48.4 per cent; n=3289), benzodiazepines (41.5 per cent; n=2818) and prescription stimulants (41.2 per cent; n=2804), with relatively small proportions reporting that they knew a lot: analgesics (17.5 per cent; n=1183), benzodiazepines (16.1 per cent; n= 1096) and prescription stimulants (11.8 per cent; n=801).

Between approximately one third and a half of Internet respondents reported that they did not know how long after taking the three categories of pharmaceutical drugs it would be safe to drive: analgesics (34.0 per cent; n=2315), benzodiazepines (40.3 per cent; n=2742) and prescription stimulants (46.5 per cent; n= 3165). Of those able to nominate a safe time frame between use and driving, most respondents reported more than 10 hours: analgesics (21.9 per cent; n=1553), benzodiazepines (28 per cent; n=1778) and prescription stimulants (17.6 per cent; n=1199).

Figure 5.9: Time required between consumption of prescription drugs and “safe” driving (n=6801)



5.4 Summary and discussion

A central purpose of the current research was to gain an understanding of perceptions and knowledge of Australian drivers towards drug driving, two important considerations for the development of effective drug-driving countermeasures.

The findings of the Internet survey indicate that driving under the influence of alcohol is widely perceived as very risky or dangerous. These findings are likely to reflect a number of factors, including the widespread use of alcohol by respondents (the vast majority reported having consumed alcohol on at least one occasion in the preceding 12 months), and the effectiveness of the high-profile, drink-driving countermeasures that have been implemented in Australia over the past 25 years. Further, the public is, as a result of these factors, generally well informed of the risks associated with drink driving. Indeed, the vast majority of Internet respondents reported that they knew a lot about alcohol and driving, with only a small percentage indicating that they knew nothing, and most respondents were able to report that between one and two hours is needed between consuming one standard drink and driving. These responses are consistent with the established Australian guidelines as the minimum time period required to be under the .05 BAC and further illustrate that the long-term and widespread alcohol education and information campaigns have been effective in informing the Australian community about the effects of alcohol on driving.

Little research has previously examined perceptions of risk or knowledge of the effects of drugs on driving ability at the general population level. What evidence is available indicates that, within the general community, (illicit) drug driving is considered very risky and more dangerous than drink driving. The reports of the key experts in the current study supported these findings, with many noting that drug driving is generally perceived as dangerous, risky and unacceptable.

Cannabis was the illicit drug least likely to be perceived by the total sample of drivers as very risky or dangerous to drive under the influence of. This may be, at least in part, a result of the relatively high levels of cannabis

use reported by the Internet sample (that is, 24 per cent reported use in the previous 12 months), who plausibly drew on their own experiences when considering perceptions of risk. Indeed, as discussed previously, many cannabis users believe they can compensate for the impairing effects of cannabis when driving. It is also possible that this perception extends beyond those with personal experience of cannabis, given its general pervasiveness in the Australian community. Similarly, the relatively high levels of methamphetamine, ecstasy and cocaine use within the sample may also account, to some extent, for the relatively low levels of perceived risk reported by the Internet sample regarding these drugs. The comparison of users' and non-users' perceptions of risk, as discussed below, will help explore this in more detail. Further, with the exception of cannabis, Internet respondents tended to report knowing very little about the effects of illicit drugs upon driving ability. Similarly, larger proportions of Internet respondents were able to provide periods of time in which it would be safe to drive following the use of cannabis, whereas they tended to report needing to wait more than 10 hours, or not knowing how long was required in relation to the other illicit drug categories.

Only a very small body of evidence exists regarding perceptions and knowledge of risks associated with pharmaceutical drugs and driving in the general community, with the findings suggesting that there is considerable uncertainty around these issues. Indeed, the key experts interviewed for the current study noted that pharmaceutical drugs are often not considered in discussions regarding drug driving, possibly as a result of their legal status. Key experts reported that the dangers of driving while under the influence of such drugs are generally underestimated. Indeed, the findings of the Internet survey indicate that pharmaceutical drugs tend to be perceived as less risky or dangerous to drive under the influence of, than alcohol and illicit drugs. This could be due, at least in part, to the perception that because these drugs are pharmaceutical-grade and prescribed, they are inherently less risky or dangerous than illicit drugs and/or alcohol. There was some variation between the perceptions of risk attributed to the three categories of pharmaceutical drugs, whereby benzodiazepines were considered by a larger proportion of Internet

respondents to be very risky or dangerous to driving. The findings of the Internet survey indicate low levels of knowledge in relation to the effect of pharmaceutical drugs upon driving ability. The vast majority reported that they knew nothing or a little, with only a small percentage reporting knowing a lot. Further, a large percentage of Internet respondents reported they did not know the time required after consumption of pharmaceutical drugs to enable “safe” driving.

Little research has previously examined perceptions of risk or knowledge of the effects of drugs on driving ability within samples of illicit drug users. The small body of research regarding illicit drug users’ perceptions of risk suggests that many consider alcohol, either consumed alone or in combination with illicit drugs, to be associated with greater risk than illicit drugs used alone. Indeed, evidence suggests that many illicit drug users do not consider their illicit drug use to increase the driving-related risk. Thus, it has previously been suggested that perceptions of risk depend, at least in part, upon individuals’ drug-using experiences, whereby drug users tend to perceive drug driving to be less risky than non-users.

Consistent with previous findings, the key experts interviewed for the current study highlighted differences in perceptions of drug-driving risk between drug users and non-drug users. It was reported that, in general, drug users underestimate the risks and degree of danger and non-drug users overestimate the risks and degree of danger, with the reality likely to lie somewhere between the two. Key experts noted that individuals with experiences of drugs draw on their personal experiences when forming their perceptions. These are reflected by broad drug-use patterns whereby younger Australians are more likely to have experience (either personal or their peers) with illicit drugs and older Australians are more likely to have experience with pharmaceutical drugs, perceptions of risk and danger associated with the different drug types are likely to differ accordingly. Concerns were raised that drug users, through basing their perceptions of risk on personal experience and that of their peers, tend to hold a range of misconceptions, and underestimate drug-driving risks. Key experts corroborated the findings from

previous studies indicating that amphetamine users perceive that amphetamine use can improve their driving ability, and that cannabis users perceive that they are able to compensate for any impairing effects on their driving. It was also noted that, consistent with previous research, illicit drug users tend to perceive driving under the influence of alcohol as more risky and dangerous than driving under the influence of illicit drugs.

The findings of the Internet survey are consistent with both the previous research and key expert reports suggesting that drug users tend to perceive driving under the influence of drugs they have used as less risky or dangerous than those with no personal experience of the drug. Indeed, this was even found to be so in the case of alcohol, whereby despite the majority of users and non-users reporting that driving under the influence of alcohol is very risky/dangerous, those who reported having consumed alcohol in the previous 12 months were more likely to perceive it is less risky/dangerous than those respondents who had not consumed alcohol in the previous 12 months. Nevertheless, the widespread acceptance of the risks and dangers associated with drink driving provide further evidence of the efficacy of the countermeasures implemented in Australia in recent years.

The differences in perceptions of risk and danger differed across the drug categories asked about, and were particularly marked in relation to driving under the influence of cannabis and stimulant drugs. For example, less than one third of cannabis users perceive driving under the influence of cannabis to be very risky or dangerous, compared to over three quarters of non-cannabis users. As discussed previously, this is likely to be due to a number of factors, including cannabis users drawing on their own subjective experiences of cannabis use, their belief that they can adequately compensate for any impairment and the general lack of negative consequences for themselves and/or their peers who drive under the influence of cannabis.

The findings in relation to methamphetamine and cocaine, both stimulant drugs, are similar to those for cannabis, whereby less than one third of users

perceived driving under their influence to be very risky or dangerous, compared to the vast majority of non-users. As discussed previously, many methamphetamine users perceive their driving ability to be improved following methamphetamine use, due to an increase in their ability to be alert and/or focused. Although cocaine users have not previously been the focus of drug-driving research, it is likely that similar attitudes are held by users regarding cocaine use and perceptions of driving risk. Although ecstasy users were significantly less likely to perceive driving under the influence of ecstasy as very risky or dangerous than non-ecstasy users, nearly half of the ecstasy users reported that driving under the influence of ecstasy is very risky or dangerous. This is consistent with the findings regarding the relatively high levels of perceived impairment last time drove under the influence of ecstasy (see chapter 4) and is likely to be related to the dissociative and/or hallucinogenic properties of many of the pills and powder sold as ecstasy in Australia.

Indeed, the majority of LSD/hallucinogenic and GHB-type substance users reported that they perceived driving under the influence of these drugs to be very risky/dangerous, as do non-users of these drugs, although again non-users were less likely to consider them as very risky/dangerous. The widespread perception of risk held by users of these drugs is also likely to be due to the subjective experiences of users of the dissociative and/or hallucinogenic properties.

Significant differences in perceptions of risk were also found between users and non-users of pharmaceutical drugs, whereby non-users were more likely to perceive high levels of risk. As with alcohol and illicit drugs, it is likely that personal experience with the pharmaceutical drugs leads to the perception of less risk to driving.

Understanding of risk perceptions and knowledge of the effects of drugs on driving ability are important for the development of effective drug-driving countermeasures. Whereas there is widespread awareness and recognition of the impairing effects of alcohol in the general Australian community, this is not the case for illicit and pharmaceutical drugs. Further, perceptions of risk differ according to individuals' experiences with drugs and are likely to be influenced by a range of factors and considerations, which have additional implications for the development of countermeasures relevant to drug users. Additional research is needed to understand drug-users' perceptions of the risk so as to inform the development of effective countermeasures across the different drug categories. In particular, further research and analysis of the current data needs to be conducted in order to elucidate the perceptions of risk for drug-drivers compared to non-drug drivers within drug-using groups, as well as to explore the potential differences between occasional compared to regular or dependent drug users. The Australian community is, in general, not well informed about drug driving and there is a clear need for factual, credible education resources to be developed and widely disseminated.

6

Countermeasures

6.1 Literature

Road safety countermeasure strategies are initiatives that aim to change the behaviour of people who engage in risky behaviours, such as driving under the influence of drugs, driving under the influence of alcohol, or speeding. Such initiatives may also aim to reinforce the behaviour of those who do not engage in such risky behaviours.

The main road safety countermeasure strategies adopted in Australia and internationally include detection and enforcement (for example, roadside testing) and public education campaigns (for example, mass media campaigns). In the past 30 years there have been major efforts to reduce the incidence of driving under the influence of alcohol in Australia, and a considerable body of research evidence exists regarding the implementation and effectiveness of drink-driving countermeasures. Broadly, the available evidence suggests that a multifaceted approach consisting of mass media campaigns and ongoing law enforcement are the most effective in reducing the incidence of risk-taking behaviours, such as drink driving (Roads and Traffic Authority of New South Wales, 2000). In comparison to the relatively long history of alcohol-related driving countermeasures, the development and implementation of those targeting illicit drugs have only been given recent attention; for example, initially sobriety testing, followed by the more recent introduction of random drug testing (RDT).

Below is an overview of a number of road safety countermeasures as they relate to (illicit) drug driving, as well as what is known about the effectiveness of such initiatives. As the current study also has a focus on pharmaceutical drugs and driving, the countermeasures employed for these drugs are also discussed.

Random drug testing

Random breath testing (RBT) is one high-profile component of the countermeasures against drink driving and has been implemented across Australia for 25 years. Extensive research has been conducted to evaluate the effectiveness of RBT, and it has been found to be an effective countermeasure for reducing drink driving (Sweedler, 2006). Following the success of RBT, sobriety testing was introduced in Victoria in December 2001. When this strategy demonstrated that drug driving was occurring on the roads, random drug testing (RDT) was introduced as a measure to reduce the drug-related road toll and trauma by reducing the number of drug-impaired drivers on the road (for example, Verstraete & Raes, 2006).

RDT was first implemented in Victoria in December 2004, and since then has been introduced in a number of other jurisdictions: Tasmania (July 2005), South Australia (July 2006) and New South Wales (September 2006). There are plans for testing to start in Queensland in 2008, and the recommendation that RDT be implemented in the Northern Territory has been made.

At present, RDT in most Australian states tests for cannabis, methamphetamine and ecstasy (MDMA—3,4-methylenedioxy-N-methylamphetamine). In Tasmania, two more substances are included: benzodiazepines and opioids. The following is a brief overview of RDT procedures. As Victoria was the first state to introduce RDT, the procedures followed in that jurisdiction are described.

Even though the RDT is “random” to the extent that drivers do not need to be driving erratically or dangerously to be tested, the initial implementation of RDT focused on known high-risk areas of drug driving, such as heavy vehicle routes and entertainment precincts. It is now gradually being implemented on a

much wider scale, alongside RBT. During the procedure, drivers are stopped at random at roadside drug-testing buses and asked to submit a saliva sample. The sample is screened at the roadside, with the result determined within 5 minutes. Drivers who return a negative test result are allowed to drive off. Drivers who return a positive test result are required to leave their car and accompany police to the drug-testing bus, where they are required to provide a second saliva sample. If the second sample also returns a positive result the driver is interviewed according to normal police procedure. The driver is provided with a portion of the second sample and the rest is sent to a police laboratory for a more accurate test. The entire process can take approximately 30 minutes. The driver is then allowed to leave after this process, although they are not allowed to drive their vehicle. Charges are not laid unless a positive drug test is confirmed by the laboratory results, with drivers notified within a few weeks if the analysis confirms that an illicit drug was present. Some states have slight variations to the RDT procedure; for example, in Tasmania drivers cannot be charged on saliva tests alone, but need corroborating blood tests.

Concerns have been raised as to the accuracy and reliability of saliva drug-testing devices. A large study evaluating the usability and analytical reliability of on-site oral fluid (saliva) drug-testing devices was carried out in Europe in 2003–05, with the researchers concluding that no device is currently reliable enough to be recommended for roadside screening of drivers (Verstraete & Raes, 2006). Further, to date no rigorous, independent evaluation trial on the effectiveness of RDT as a deterrent to drug driving has been undertaken. Unpublished data from Victoria, however, have been used as evidence that RDT has a deterrent effect and is, therefore, a useful strategy to address drug driving. Specifically, it has been reported that the level of awareness of RDT increased from 78 per cent to 92 per cent of drivers, and that 33 per cent of illicit drug users stated that the tests have influenced them to the extent that they avoid taking drugs when they are going to drive (Dr Swann, personal communication, as published in Verstraete & Raes, 2006). Finally, according to Dr Swann, the proportion of drug drivers on Victorian roads dropped as a result of the RDT introduced in 2004,

from 45 per cent to 35 per cent (as cited in Verstraete & Raes, 2006). However, considering that RDT was initially targeted to “high-risk” areas, such as long-haul truck routes and late-night entertainment precincts, where relatively high levels of drug driving may be expected, and that more recently RDT has been targeted to a more widespread driving population so as to encourage greater awareness, it is not surprising that the incidence of positive RDT results declined. Therefore, at this stage in the process, this drop in incidence may be a result of a change in characteristics of the drivers targeted. It will take some time, as well as the collection of data from a cross section of the community, before we can be sure of a change in drug-driving behaviour due to the implementation of RDT (Papafotiou, personal communication, 2007).

There is a growing body of attitudinal research that can be used to shed light on the potential effectiveness of RDT as a deterrent to drug driving. A number of studies focusing on drug-users’ perceptions of RDT have found drug users question its effectiveness, perceiving little chance of being tested and caught. For example, Davey, Davey & Obst (2005) examined attitudes of 275 Victorian cannabis users regarding the risk of being caught by the police while driving under the influence of cannabis. Approximately half of the participants reported that they would continue driving following drug use, citing the inadequacy of roadside testing as the main reason for their confidence in escaping detection (Davey, Davey & Obst, 2005). Similarly, Degenhardt et al. (2006) found that the majority of 273 clubbers sampled in this study reported that there is little chance of detection and apprehension due to the difficulty of implementing roadside testing. Donald, Pointer & Weekley (2006) found comparable attitudes in their sample of 91 illicit drug users, nearly half of whom expressed no concerns at all about getting caught by the police after using an illicit substance. Indeed, Lenton (2005) has argued that for roadside testing to act as an effective deterrent there needs to be at least a 30 per cent chance of being apprehended.

In contrast, however, cannabis users have been found to express a reluctance to drive under the influence of cannabis if they knew that police could randomly test

them for drugs (Jones, 2006). Jones, Donnelly, Swift & Weatherburn (2006) also found that if drivers know that penalties will apply if they are found driving under the influence of drugs, the rate at which they report they will do so reduces. These findings are consistent with research from the United Kingdom, which found that 65 per cent of regular cannabis users reported that they would be deterred from driving under the influence of cannabis if there was random roadside testing in their area (Terry & Wright, 2005).

Thus, although RDT is now being rolled out in most jurisdictions across Australia, there are considerable gaps in the research evidence regarding the accuracy and effectiveness of such strategies, and it is vital that such research is undertaken to better inform the implementation of future countermeasures.

Public education campaigns: social marketing and/or mass media

A commonly employed road-safety strategy is the use of social marketing and /or mass media to disseminate information to the general public in order to correct misperceptions, and to increase the acceptability of a social idea, or practice, among a large target group. Mass media campaigns have enormous potential to reach a diverse and vast audience (Richards & Carroll, 2002) and a number of drug driving-related campaigns have been implemented in Australia in recent years. These campaigns have tended to have two main aims, namely to:

- educate the public about the dangers of driving while affected by drugs
- inform the public about RDT and the potential for being charged for driving under the influence of drugs.

General education campaigns have tended to focus on increasing awareness about the potential effects of drugs on driving ability, as well as increasing awareness about health and social implications of driving while influenced by drugs. For example, although RDT has not been introduced in Western Australia as yet, extensive drug-driving education has been carried out since 2005 through convenience advertising, information cards,

booklets on drugs and driving, posters, youth press advertising and project support kits. Although such information has been made available on various websites in other Australian states, drug-driving education campaigns in jurisdictions that have introduced RDT education campaigns have tended to focus on informing the community about the implementation RDT rather than the dangers associated with drug driving. These initiatives aim to alert drivers that, following the introduction of RDT, there is the potential for them to be tested and penalised if found to be driving with drugs (that is, cannabis, methamphetamine or MDMA/ecstasy) in their system. For example, an extensive education campaign utilising television, radio, outdoor signage and online advertising was launched in Victoria in December 2006. The main message of the campaign was that drug driving will not be tolerated and that police will be "out in force". More recently a new campaign is being implemented with the message: "if you drive on drugs you are out of your mind".

As there is no published literature available, to the best of our knowledge none of the drug-related mass media/ social marketing campaigns implemented in Australia have been evaluated. However, there is a considerable body of evidence on a number of key aspects that are regarded as central for successful, general road-safety mass media/social marketing campaigns that are likely to have relevance to the development of drug-driving mass media/social marketing campaigns. First, the most effective road-safety mass media campaigns have been found to be those that use the findings of prior research, either qualitative or quantitative, and that are based on a theoretical model to inform the development of messages and execution (Elliott, 1993). Second, the use of public relations and associated publicity appears to be more important to the outcome of the campaign than the use of enforcement (Delaney et al., 2004). The combination of public relations and enforcement as supporting activities, however, shows particularly large effects (Delaney et al., 2004). Indeed, mass media campaigns are ideally just one component of broader strategies, other components of which may include detection and enforcement (Barry, 1992; Newstead, 1995) as well as education and community based programs (Boots & Midford, 2001; DeJong & Winsten,

1990). Finally, campaigns with a persuasive orientation and those that use emotional rather than rational appeals have been found to have a greater effect on the relevant measure of effect. In contrast, information-based and educative campaigns have been associated with less effective campaigns (Delaney et al., 2004).

Drug-driving prevention programs

Educational programs for drug-driving prevention are another strategy that may be adopted as part of road-safety initiatives. Drawing from the wider drug-prevention field, drug-prevention programs work within a risk-protective paradigm, aiming to reduce risk factors while enhancing protective factors. Research has indicated that the most effective drug-prevention programs are those that teach individuals techniques for resisting drug use, in combination with more general social skills and personal development (Botvin, 2000). The knowledge base provided by drug prevention may prove to be of relevance when designing and evaluating drug-driving, road-safety education programs.

In the United States, Griffin, Botvin & Nichols (2004) examined the effectiveness of a drug abuse prevention program on risky driving, which focused on both addressing risks and enhancing the competence of junior high school drivers. This program involved provision of resistance skills against drug driving, along with the development of participants' general social and personal skills. Overall, the results of this study indicate that students who participated in the program were significantly less likely to engage in drug driving, compared with those students who did not attend the program (Griffin, Botvin & Nichols, 2004).

Pharmaceutical drug-specific driving countermeasures

Although attention has increasingly been given to the issues of drug driving in relation to illicit drugs such as cannabis, amphetamine and ecstasy, relatively little attention has been given to pharmaceutical drugs and driving. Given that many pharmaceutical drugs have the potential to impair driving ability, it is important that countermeasures also be developed with the aim of reducing the prevalence of pharmaceutical drug-

impaired driving. Indeed, the National Road Safety Action Plan 2001 and 2002 (Australian Transport Council, 2003), along with the recent Inquiry into Substance Abuse in Australian Communities conducted by the Standing Committee on Family and Community Affairs (The Parliament of the Commonwealth of Australia, 2003), both recommended that campaigns and driver-education programs need to be expanded to cover information about not only illicit drugs, but also the impact of many pharmaceutical drugs on driving.

As pharmaceutical drugs are typically accessed by the community through prescription or from a pharmacist, the countermeasures for these drugs are potentially quite different to those used for illicit drugs. For example, common countermeasures for pharmaceutical drugs include labelling and information dissemination through doctors and pharmacists, including Consumer Medicines Information. There is evidence, however, that such countermeasures have limited impact on the behaviour of consumers. For instance, a study in Europe found that, although patients were warned of the side effects of pharmaceutical drugs (for example, drowsiness, impaired vision), they tended to ignore the advice given to them by doctors and pharmacists and in information leaflets, and drove after having taken such drugs (Horne & Barrett, 2000).

In addition to such information strategies, law-enforcement strategies have also been adopted in relation to driving under the influence of pharmaceutical drugs. For example, in Victoria, in 2000 the *Road Safety Act of 1985* was amended such that police are able to apprehend drivers they suspect are impaired by drugs other than alcohol. This process is still used by police if they suspect that a driver may be impaired by a drug that is not detectable through RDT. In the first instance, if police suspect a driver to be impaired, the driver is stopped and breath-tested for alcohol use. If they return a positive result they are charged with a drink-driving offence. If the breath-test reading is not unlawful, the driver is required to perform a number of tasks, known as "Field Sobriety Testing", that have been validated as being reliable measures of drug-induced impairment (Parliament of Victoria Road Safety Committee, 2000). Those who perform poorly

on the test are required to go to a police station for a second breath test, and to provide blood and urine samples to test for the presence of drugs; these are tested for all drugs (illicit and licit). If over-the-counter and/or prescription drugs are deemed to be the cause of driving impairment, the driver is required to prove that he or she did not know the drug could/would impair their driving, or that he or she had taken the drug/s in accordance with a pharmacist's, doctor's or dentist's advice (Uniting Care, 2006).

Although Field Sobriety Testing is a procedure that, in theory, is designed to apprehend pharmaceutical drug-drivers, the implementation of this strategy is not widely publicised. Further, there is little research regarding the effectiveness of such procedures. Recently, however, Boorman and Papafotiou (2007) found that, of those drivers suspected of being under the influence of drugs and processed for driving while impaired, over 80 per cent have drugs detected in their blood sample, with benzodiazepines detected in the majority of cases and approximately 60 per cent being polydrug users. As noted previously, Lenton (2005) has argued that for roadside testing to act as an effective deterrent there needs to be at least a 30 per cent chance of being apprehended. Given low levels of knowledge of this testing and low levels of actual testing, it is likely that the countermeasures for pharmaceutical drugs have limited impact.

Summary

A considerable body of evidence exists regarding the development and effectiveness of countermeasures for drink driving, with a growing amount in relation to illicit drugs and only a small amount in relation to pharmaceutical drugs. Overall, the evidence suggests that a multi-component strategy (including detection, enforcement and mass media) is the most effective in reducing risky driving behaviours. Further, the most effective campaigns appear to be those based on prior research findings and that have a theoretical basis.

6.2 Key expert interviews

The reports of the key experts regarding countermeasures for drug driving are presented in the following section. As distinctions were made between the countermeasures appropriate for illicit drugs and those for pharmaceutical drugs, they are discussed separately.

Countermeasures for illicit drugs and driving

Experts raised three main countermeasure strategies that can be used to target illicit drugs and driving: RDT, education and structural measures. Experts discussed that the most effective strategies incorporate a range of initiatives, as demonstrated by drink-drive campaigns.

E19: You have to have the whole package—the ability to detect and enforce, but there has to be the education component that goes along with it. And that's been very successful in the alcohol area, with the enforcement processes coupled with the education and behavioural change education type mechanisms.

Random Drug Testing

Key experts described the significant public support for the implementation of RDT:

E19: Well, I think the general public attitude is that drugs and driving is a very significant issue for them. There is a great deal of support publicly for the random drug testing program. In fact a public survey indicated there is 98 per cent public support for the random testing of people for drugs.

While experts discussed the value of RDT, however, there were some concerns raised as to its effectiveness, with suggestions made for the future. In the main, key experts described that people are much less likely to drug drive if they believe there is a chance that they will be caught and penalised for doing so. The reduction in the prevalence of drink driving was cited as evidence that such measures are effective.

E3: The only way you ever get any sort of real impact on driving and road safety is random

testing ... The risk of being caught is the biggest factor that will influence driving behaviour. We've seen that in Australia through the research on RBT.

Key experts 19 and 20 both suggested that, because RDT is based on the principles of the successful drink-driving testing, in time we will see similar benefits with drug driving.

E19: The high visibility, rigorously enforced, sustained and the high publicity with alcohol has found to be a useful process to reduce the incidence of it, so there's no reason to believe that we won't have the same successes with drugs.

E20: I think that it's taken many years for things like road-safety initiatives such as motorbike helmets, seatbelts and even the .05 legislation to really get ingrained right across the culture of driving. This will take some time but I think it has started to make that impact. We're certainly getting early indications that people, even at rave parties now, are backing off taking pills or smoking before they drive because of the potential that they will get detected.

However, many key experts raised concern about RDT, including its deterrence value, the length of time the testing process takes and the potentially undesirable impacts of RDT. Three main concerns were expressed about RDT's deterrence value. First, experts discussed how the success of RDT is dependent on the frequency of testing, and therefore the likelihood of being drug tested. It was raised that the current practice of having a limited number of buses, located in predictable locations such as outside raves and nightclubs, does not give the community the perception that they could get caught. Second, experts raised concern about the high false-negative rate of testing in relation to cannabis. Expert 2 described that, while saliva can be an accurate means of ascertaining when different drugs have been recently used, he felt that the equipment is not as reliable at detecting when cannabis has been recently used.

E2: For all of the illicit drugs currently being tested, the rates of false positives are very, very low, but for cannabis in particular the rates of false negatives are quite high.

Other experts discussed that swabs of saliva will only detect cannabis particles that are still present in the mouth, providing an indication of very recent cannabis use, and that blood is the only bodily fluid that gives an accurate indication of the concentration of THC in the system. In contrast, Expert 20 was confident that the technology is accurate.

E20: Oh, look, there's no doubt that the technology is reliable. It's got to be 100 per cent accurate all the time. There's been a lot of work put into this, a lot of money and a lot of effort by a lot of people. So I honestly believe it's an accurate tool, an accurate measure.

Indeed, in contrast to cannabis, key experts suggested that saliva is a very accurate medium for ascertaining recent amphetamine use.

E3: Oral fluid is a fantastic medium for amphetamines ... It's as good as blood so it's excellent. It's got ... 99 per cent specificity and sensitivity.

Key experts highlighted that, in order for detection and enforcement to be successful, it is crucial that better technology is developed.

E19: The challenge is development of technology to allow greater enforcement, because unless we have that threat of detection and sanction, then people are unlikely to change their behaviour.

Other limitations to RDT were raised, including length of time that RDT takes to implement, in particular when compared to RBT. Expert 13 commented that, due to the lengthy procedures, fewer people are pulled over for drug testing than they are for drink driving. However, Expert 4 did stress that RDT technology is rapidly changing and improving. Expert 20 also suggested that with improvements in the techniques, the time factor will not be an issue.

E20: We do far more breath testing because the sheer reality is that the drug testing is expensive. It takes a bit longer. You know, we can put 3000 people a night through a booze bus. But as the technology gets better, and the cost comes down,

and we get more and more, then every time you get pulled over you'll get done for both. That's the ultimate I suppose.

Experts raised that there could be some potentially undesirable, unintended and negative consequences for RDT. First, there was concern that, rather than preventing drug users from driving while impaired, it may simply lead them to use drugs that are not detectable by RDT. It was pointed out that, because RDT currently only tests for the presence of three illicit drugs (cannabis, methamphetamine and MDMA), people may shift to using other drugs that are not tested for, and that this needs to be monitored.

E8: If the drivers are clever enough, they might just switch to a different drug, so obviously we need to keep posted (on drug driving trends).

Secondly, concern was raised that the focus on drug driving might divert attention from RBT. Experts indicated that RDT is a very expensive process and were concerned that because of this, much-needed resources may be diverted from RBT to RDT. Experts argued that it would be a bad road-safety outcome if resources were diverted from RBT to RDT, as drink driving is a greater road-safety issue than drug driving.

E3: Alcohol is the biggest contributor [to road accidents] and will remain so. You have to be really careful that you don't get sidetracked off that.

Key experts raised a number of issues in relation to the research and evaluation of RDT. First, a number of the experts voiced concern about what research informed the introduction of RDT in Australia and, in particular, that certain evidence was "ignored." For example, although there was evidence obtained in Europe (in the large ROSITA study, Verstraete & Raes, 2006) that questioned the effectiveness of RDT, this research has effectively been disregarded in Australia. Expert 13 described that a conclusion of these studies was that saliva is not a good measure of impaired driving ability and that RDT is "very expensive and probably not really worth it."

E2: ROSITA is a well-known study and yet it's not appearing in any of the discussions ... and it should be.

Expert 2 questioned the reliability and validity of research that was influential to Australian decisions. He suggested that policy makers overlooked important intricacies of the issue:

E2: I feel that rather than evidence guiding policy, policy has come in and now we're busy trying to find the evidence to support it.

E13: I think they've really jumped in ... before it's really been firmly established that it's worth it.

Second, some of the experts discussed how RDT research within Australia is too insular, and there were suggestions that research needs to be conducted by independent researchers, published in academic literature and impartially debated and evaluated, rather than limited to those with vested interests in RDT. Expert 4 suggested that policy makers are getting their information and advice about the testing equipment from sales representatives who are telling "awful lies". Expert 3 suggested that external bodies need to conduct some evaluations, because when done internally, there is the risk that evaluations are selective in the aspects they highlight. She felt that they might not tell "the whole story [in order to] back up the political rhetoric".

E2: There has been a lack of independent research. The majority of research has been conducted with the companies' (who manufacture the tests) involvement ... I've yet to see the evaluation of the first year or RDT in Victoria published in an academic journal ... [RDT] needs to be debated and it needs to be debated in an academic forum—not in the media.

Some experts raised that the current trials of RDT need to be evaluated for a number of aspects, including whether it is an effective deterrent for drug-using populations and whether it is a cost-effective strategy. For example, Expert 3 indicated that, as RDT is very expensive—up to \$200 for each sample analysed—governments cannot afford to maintain this strategy. Expert 3 stressed that, if the allocation of resources is to be satisfactorily reviewed, there needs to be independent external evaluation, including whether

money is being diverted from drink-driving measures to drug-driving measures.

E3: We need to keep our eye at all times on what they're spending on drink driving ... that's why it needs to be externally evaluated.

However, experts discussed that there are some real obstacles to improving the research into RDT. It was pointed out that convincing policy makers to fund independent research may be difficult, as they may not be receptive to criticisms of initiatives that have already been trialled at great expense. In addition, Expert 5 suggested that policy makers may be hesitant for fear of a perception of being "soft on drugs," as she believes that current Australian governments are unlikely to do anything that will make them appear anything but "tough on drugs."

E5: I think that's a huge challenge—trying to convince people without criticising the law. Trying to convince people that there's still more work that needs to be done, but how do you do that without criticising what's been done so far? I think that we live in a culture in Australia at the moment where governments want to appear to be tough on drugs ... So if you are raising questions about whether or not this is the way to go, you appear to be soft on drugs.

Expert 3 stressed that these research and evaluation problems need to be addressed, but she felt that those involved in RDT are reluctant to acknowledge the problems and thus reluctant to address them.

E3: They don't want to talk about it because we haven't got a solution. But we need to talk about it in order to find a solution.

Information and education initiatives

Information and education initiatives were highlighted as a very important countermeasure strategy for addressing illicit drugs and driving. Key experts argued that an educational component is essential if attitudinal and behavioural change are to occur. It was raised that the community needs to be informed about the potential problems and dangers associated with drugs and driving.

Expert 18 argued that extensive information and educational campaigns about the dangers associated with drink driving is a significant factor behind the change in society's views, from fairly unconcerned, to intolerant of drink driving. Experts described that drug driving requires a sustained and integrated campaign to inform the community.

E19: I just think generally, the level of information and education that's going on about drugs and drugs and driving, is far too little. I mean, as I say, alcohol we've been doing for years, and there's a lot of it and it's well understood and well recognised and people have changed their behaviours. But we've got a long way to go with drugs.

E18: The community standard has changed [for drink driving] now ... but they haven't even started on that process yet with drug driving—that social responsibility, personal responsibility side—to do that, we need as comprehensive and long-term campaigns as we've had with drink driving.

In addition to the general education about the dangers of drug driving, experts stated that it is crucial that the public is informed about RDT. For example, experts indicated that there was a lack of information about RDT prior to its introduction in Victoria. Expert 5 argued that it is unfair that people can suddenly be punished for a behaviour that they had not been informed about. It was suggested that enforcement procedures need to be introduced alongside or after education initiatives, whereby the education includes information about RDT and the impairing effects of drugs and driving.

E15: Get them to understand that there is a reason behind [RDT]; it does impair your driving, this is why we're enforcing it and there is a chance you will get caught.

Experts also stressed that the public information needs to be truthful and based on facts. It was argued that "scare tactics" and exaggerated information are counterproductive, as information that is incongruous with people's knowledge and experience runs the risk of being disregarded.

E13: If you hammer everyone on the head saying, “drugs are bad, blah blah blah ... If you drive after having a cone you will die”, people will delight in rejecting that ... and they will come up with very different ideas about the risks associated with drugs and driving.

Rather, credible information that is not politicised, but is based on current research, needs to be disseminated to the public.

E20: There has been some really good research around drug driving and the impact of it. Getting that information to the wider public may need to be condensed in booklet form or in something that they can understand better.

Distinguishing between different drugs was also considered important. For example, Expert 10 stressed that it is crucial that education campaigns distinguish between the different drugs and their effects, rather than having blanket messages about “drugs”.

However, Expert 18 commented that the lack of clear, conclusive findings about how various drugs affect driving ability is an obstacle to the provision and dissemination of factual information: “You cannot provide the facts if you do not have the facts”. Expert 5 also indicated that, in order to provide credible information, there needs to be acknowledgment that there are gaps in the research.

Indeed, some experts raised that the development and provision of drug-driving education is potentially a much more complex issue than that of drink-driving education, due to the range of drugs and associated impairments. Expert 8 commented that “because there’s more than one drug involved ... it’s a harder message to get across”. In addition, Expert 6 indicated that it is harder to provide accurate information about drugs and driving because illicit drugs are unregulated. That is, alcohol is quality assured, hence advice can be offered about such factors as to how long impairment is likely to last.

It was raised that any drug-driving initiatives need to be implemented alongside drink-driving education. Some of the experts suggested that combining the delivery of

drug-driving information with drink-driving information would be sensible and more effective. A uniform approach would make things less complicated for the general public, in that they would only have to take on one message: that drugs (including alcohol) and driving are not a good combination. It was also suggested that, owing to the success of drink-driving campaigns, if drug-driving campaigns were combined with drink-driving ones, people might be inclined to transfer their negative opinions about drink driving to drug driving.

E3: Include it all as one thing ... so that people transfer the messages, that they’ve had for decades now, about drink driving and the impairment, to other drugs.

Finally, drug use was highlighted as just one of a number of factors that can impair driving ability. As such, it was suggested that drug driving should be included within a more general campaign about factors that impair driving. This may indicate to the public that drug-driving initiatives are not targeted to “catch” illicit drug users, but rather are a genuine attempt to improve road safety.

E3: I don’t think the drug is the issue, the impairment is the issue, and if you’ve stayed up all night swatting for an exam, you are impaired and so you shouldn’t drive ... [The focus should shift from illicit drugs to] “are you in a state to drive?”

Experts discussed how a harm-minimisation approach needs to be adopted for drug driving. In particular, experts suggested that it is crucial that those who drug drive be provided with harm-minimisation information. Expert 6 suggested that certain groups, in particular drug users, are more likely to take on board harm-minimisation messages and reject abstinence messages. For example, harm-minimisation information could be provided about measures that can minimise impairment to driving ability.

E11: There should be ... education as to what to do to help you recover to be able to drive again, and realistic steps to be able to do that rather than just ... “You can’t drive for the next three days”. Why not put in some realistic measures that people can take to make sure that they are safe on the road?

Experts raised that the philosophical beliefs held in relation to illicit drugs influence the sorts of information believed to be appropriate for drug driving. Expert 6 suggested that one of the obstacles to developing a comprehensive education campaign about drug driving is the difficulty in getting different groups to agree as to what information should be included and how it should be delivered.

E6: You're not supposed to smoke pot at all. You can't have a little wallet card that says ... "one joint per hour" ... and hand that out at schools. It's going to be very tricky to do that education. You're going to have people who aren't receptive to that because they're zero tolerance.

E19: To say, "Well, it's illicit", in many cases the drug they're using is illicit and they shouldn't be doing it. But you've got the harm-minimisation process to consider because the reality is they are going to use it.

Key experts highlighted that, while some parallels can be made with alcohol, the messages for drugs are quite different, and are potentially very difficult for governments to implement, with considerable political obstacles to implementing harm-minimisation messages in relation to drug driving.

E19: In some ways some of the messages are similar to the ones that we've had for alcohol and driving, but there are differences. From a government/regulatory point of view, it's very difficult to say, "Look, it's ok to use illicit drugs but don't drive". In fact, we just can't say that. The first message is, "You shouldn't be doing it" (taking drugs). And the next message is, "Well, if it does happen you shouldn't be doing this" (drive). They are very difficult messages to develop.

Finally, some of the experts pointed out that there is a risk in sharing certain information with the public. Expert 15 indicated that RDT statistics imply that it is more common for people to drive while affected by amphetamines than by cannabis. But this is due to the limitations in detection of cannabis, not due to there being a higher percentage of amphetamine-impaired drivers. Experts argued that if attempts were made to

quell a moral panic about amphetamines, the problems with cannabis detection would need to be revealed, and would thereby jeopardise RDT's deterrence value.

Delivery of information

There was general agreement among experts that education campaigns for drug driving need to be targeted, with different methods being used for different sub-groups.

E19: Whilst you can have a general message that using drugs and then driving is dangerous, that's ok, but then you have to be a little bit more specific and target the information and messages to the groups that we want to influence.

A variety of ways of delivering drug-driving information was suggested by experts, ranging from targeting the wider population to more specific sub-groups of potentially at-risk individuals.

First, media campaigns were suggested by many of the experts as a means of delivering drug-driving information to a wide variety of people. Expert 17 felt that it should be as intensive as drink-driving media campaigns, in the sense that all forms of media should be incorporated, including radio, television and the print media. Some of the experts stressed that it is important to avoid messages that sensationalise the risks or use "scare tactics". Some experts indicated skepticism about whether it is possible for media campaigns not to be "over-the-top". Expert 11 commented "I don't think they're capable of it. I'd like to see them try".

Second, many of the experts raised the education of young people and new drivers as an important strategy that could be implemented through initial driver education as well as through general school and parent education. Driver education was considered an important setting, whereby information about drug driving could be included within driver education booklets. People are tested on the content of these booklets, so it was suggested that they would be an ideal way to ensure that people are aware of the issue of drug driving and the associated dangers. In addition, schools were considered a more general setting to begin educating young people about drug driving.

Expert 17 suggested that it would be particularly important to educate those in late high school, as they are likely to be “on the cusp of getting their [driver’s] license”. Expert 19 acknowledged that, while it is potentially contentious talking about illegal drugs in schools, drug education needs to include all contexts, including health, impact on life in general as well as driving. Parents were raised as an important group to educate, so that they can provide support to their children when they learn to drive.

E19: It’s contentious talking about these issues in schools, but if the messages and the information is appropriately tailored for those environments it’s a good way to go. The more information that’s out there the better ... I think there’s a need to educate parents as well because there’s a naivety out there about drug use and the effects of drugs. Because young people are very mobile, their cars play a large part in their life.

Third, the use of communications technologies, such as websites and mobile phone technologies, was considered an effective strategy, particularly for reaching young people. Experts 16 and 7 suggested having information, and links to information, about drug driving available on websites typically utilised by the target groups. As such, Expert 15 suggested that it is necessary to keep up to date with how young people access information.

Fourth, more specific, targeted initiatives need to be implemented that reach at-risk groups and individuals who are using drugs, and therefore are potential drug drivers. Nightclubs were considered an effective setting to target such individuals. A few of the experts suggested making drug-driving information available at recreational venues frequented by young people. Expert 15, for instance, suggested putting “convenience advertising in the bathrooms of clubs and pubs”. Peer education was highlighted as an effective way to convey information about drugs and driving to young people. It was suggested that young people, drug users and “ravers” in particular, consider peer-delivered information to be much more credible than information from other sources. Expert 11 commented that:

Peer education is the key to reaching the population. Ravers are fairly tight knit and untrusting of more traditional sources.

Finally, experts raised that, as with alcohol, there is a need for widespread diversionary education and/or treatment programs for drug-driving offenders.

E20: There’s nothing in relation to drugs currently. If it’s alcohol, you do a course, you’ve got to do certain things. If it’s meth or cannabis, that’s it. There’s no requirement for you to go and do anything education wise or treatment wise.

Structural measures

Key experts raised structural interventions as an important strategy in reducing drug driving. They suggested that specific interventions need to be implemented for specific at-risk populations; for example, improved work options/conditions for truck drivers and improved transport options for those attending raves and clubs.

First, experts raised that, due to high proportions of amphetamine-related incidents involving truck drivers, there is a clear need for strategies that focus on truckers. Expert 13 suggested that unrealistic driving schedules make truck drivers feel it necessary to take amphetamines to stay awake for longer periods.

E2: I think an effective countermeasure to stop truck drivers from taking amphetamines is to have a close look at their work conditions ... and the employers ... to determine why it is that they feel the need to take amphetamines in the first place.

It was suggested that it is important that employers of truck drivers should be required to make driving schedules more realistic, so that truck drivers can have adequate sleep when they are on long-distance journeys.

Experts also discussed issues with entertainment events such as raves and late-night clubbing as important to be addressed through focused strategies. Five experts raised that alternatives to driving need to be provided/available, other than having to take taxis

which, as Expert 1 pointed out, can be very expensive. Experts suggested that the availability of late-night public transport would be a potential way to reduce the number of people driving home after they have consumed drugs. Expert 6 suggested that organisers of large rural events such as raves should be encouraged to provide bus services, alongside actively discouraging driving by increasing the cost of parking.

Countermeasures for pharmaceutical drugs and driving

A number of the experts highlighted that drug-driving education campaigns need to include information about licit drugs as well as illicit drugs, otherwise there is a risk of false assumptions being made that drug-impaired driving is confined to illicit drugs. As such, experts stressed that people need to be made more aware that drug driving is not limited to illicit drugs, as many prescription medicines can impair driving ability.

E2: I think part of the public that are opposed to illicit drugs have yet to make the realisation that a drug is a drug ... regardless of its legal status.

E12: Look across all of the substances and not be judgemental, but say "Well, there are a range of substances out there which are going to impact on our ability to drive a motor vehicle".

Two main strategies that have previously been adopted addressing the use of pharmaceutical drugs and driving are the provision of information and education of patients, and the detection of pharmaceutical-impaired driving through sobriety testing.

Two of the experts indicated that they do not think anything needs to be done about pharmaceutical drugs and driving, as it is not a significant problem. For example, Expert 8 suggested that things work satisfactorily as they currently stand, whereby those who take potentially impairing prescribed drugs are provided with adequate warning/advice from both their medical practitioner and their pharmacist. Moreover, this expert suggested that people take responsibility for themselves and avoid driving if they think their performance is impaired.

E8: I think between the medical profession and the pharmacist, both should, and probably do, give appropriate warning to those patients. And if the patient feels that they're a bit tired then I think a lot of people would probably say "Look, I'm a bit under the weather at the moment, let me do what my doctor told me to do and not drive for a few hours until the drug stabilises".

Other experts, however, indicated that new ways to address the issue of prescription and over-the-counter medicines and driving need to be developed.

E2: I think that we know that medications can effect your ability to drive ... I mean that's a given. It's what we do about it that I think we need to be thinking more closely about: How we disseminate it to the general public, and how we disseminate it to politicians and policy workers?

Key experts suggested that a number of existing initiatives for prescription and over-the-counter medicines could be strengthened. These include education campaigns; the provision of warning labels supported by verbal information from doctors and pharmacists when dispensed; encouraging doctors to prescribe drugs that are less likely to have an impairing effect; and providing more information about enforcement measures in place for licit drugs and driving.

Older people were raised as a particular risk group for pharmaceutical drugs and driving. For example, Expert 19 indicated that more needs to be done in informing seniors about the impact of their medicines on their driving.

Expert 6 described that information needs to detail how and why medications can be dangerous. As described earlier in relation to education about illicit drugs and driving, experts reported that many people are more likely to change their attitudes and behaviour if they have an understanding of how and why that behaviour may be dangerous.

E6: Not just say "Don't take it", say "If you do, this is what could happen" ... It's no good saying to someone "Don't do it", you need to explain to people why, so that they understand the repercussions.

Experts discussed the labelling of medicines as a strategy, but also questioned the effectiveness of such strategies. Expert 7 commented that, although many medicines do contain warning messages in relation to impairing driving ability, he questioned whether people pay attention to, or understand the significance of, such messages.

E7: I know there are messages ... on the packs of medicines ... but I don't know if there's a huge amount of understanding around it.

Expert 3, while acknowledging the labelling of medications as an important strategy, stated that it should not be relied upon as a sole countermeasure initiative.

Other strategies that support warning labels include Consumer Medical Information, signs in doctors' surgeries and verbal advice from doctors and pharmacists. However, many of the experts raised doubts and limitations to the effectiveness of conveying illicit drug-driving messages through Consumer Medical Information and signs in doctors' surgeries. For example, Expert 16 indicated that written warnings need to be consolidated with verbal advice, at the time of prescribing and dispensing. Expert 16, however, questioned how often pharmacists/pharmacy assistants inform patients who are purchasing potentially impairing drugs: "I don't know on an ongoing basis how frequently it is raised".

Given that a combination of pharmaceutical drugs have the potential to affect driving more so than pharmaceutical drugs taken on their own, experts also highlighted the need for doctors and pharmacists to ascertain whether a patient is taking other medications. Expert 16 pointed out that while such information would be on record if the medications were bought at the same pharmacy, if bought at different pharmacies there would be no formal record. Expert 16 also highlighted that while medical practitioners and pharmacists have a responsibility to inform people about how prescribed and over-the-counter drugs may impair driving ability, it is up to people to take it on board and adhere to this advice. Compliance is a significant issue for the medicine "drug" driving debate.

Expert 16 felt it would be an interesting study to investigate how stringently people comply with advice. That is, whether they take their medications at the time, and/or the dosage level, that they are advised to. In addition, it would be interesting to question consumers, medical practitioners and pharmacists about whether they think good questions are asked, and whether good advice is provided.

Expert 16 suggested that doctors should be required to prescribe alternative drugs, and less impairing drugs, for drivers. Experts 13 commented that, as drug companies develop drugs with fewer side effects, the onus is on medical practitioners to prescribe types of drugs that are "less likely to be linked to crash risk".

Experts highlighted that, since some medicines must be taken to control life-threatening health conditions, there is concern that mass media messages in particular, could be potentially risky, whereby patients, through concern for their medication and driving, could stop taking their drugs.

E20: We don't want people out there to be frightened of taking properly prescribed medication ... You don't want them to be frightened about stuff because it gets blown out of proportion because the media has a certain ability to do that, and then they get frightened so they don't do what they should be doing.

Finally, detection and enforcement was raised as a strategy to address pharmaceutical drugs and driving. It was highlighted that, unlike RBT and RDT, which are high-profile, general deterrence methods, pharmaceutical-impaired driving is largely detected by sobriety testing. Expert 19 indicated that while it has not been widely implemented in the community, nor has the community been widely informed of it, sobriety testing methods are very successful. Although it is limited in its ability to convict drivers, sobriety testing is effective in getting impaired pharmaceutical-drug impaired drivers off the road.

E19: (Sobriety testing) isn't high profile ... in terms of process, the driving while impaired program has been very successful. It focuses on the detection of impaired drivers, which is a specific

deterrent-type strategy, where really only the people involved know that it's occurring ... so if a person is impaired by their medication, we can deal with them. Not necessarily prosecute them, but take them off the road. And in cases where people are misusing prescription medication we can prosecute them.

None of the key experts described the implementation of RDT as feasible for pharmaceutical-drug driving. Given that such a large proportion of society falls under the category of "licit drug driver", key experts suggested that there were too many political and practical obstacles to a full-scale RDT initiative for pharmaceutical drugs. Key experts discussed that, unlike with alcohol and illicit drugs, prescription drugs are taken by people for health reasons, and their driving may in fact be worse if they were not taking the drug, or took it at a lower dose. In addition, key experts highlighted that the testing for pharmaceutical drugs cannot discriminate between whether someone is taking certain substances legitimately or not, nor can it distinguish between medicines taken at safe or dangerous/impaired levels. Finally, key experts highlighted that testing equipment cannot distinguish between different drugs that are chemically very similar but quite different in their impairing effects.

E19: At this point the technology limits us in what we can do. For example, in terms of the opiate classes of drugs, we can't distinguish between, say, heroin or morphine or codeine. People would be legitimately taking their headache medications and we would be getting positive results ... it would be an awfully intrusive process for people.

Finally, key experts raised that, as part of broader education strategy, it is important that the public are informed about measures in place for testing of pharmaceutical drugs and driving. For example, Expert 2 suggested that more effort needs to be put into informing the public that they can be tested and detected with sobriety testing (and blood testing), and subsequently charged by the police if their driving ability has been impaired by prescription drugs. He felt that at this stage that information "hasn't been well disseminated to the general public". Key experts suggest

that the public may take the issue of driving while affected by licit drugs more seriously if they think there is a chance that they will get caught for doing so.

6.3 Internet survey

Several questions on the Internet survey component of the current research were designed to elicit data relevant to countermeasures, including:

- sources of information regarding drugs (other than alcohol) and driving
- decisions made regarding driving after consuming drugs
- experiences and perceptions of roadside testing.

Sources of information

The Internet respondents (n=6801) were asked where they had previously received and where they would like to get in the future, information about drugs (other than alcohol) and driving. As presented in Figure 6.1, respondents reported having received information about drugs (other than alcohol) from a wide range of sources. The most common sources were the media (that is, newspapers, radio, television: 72.2 per cent), friends (54.6 per cent), leaflets/pamphlets (43.0 per cent) and the Internet (41.5 per cent). When asked where they would like to receive information about drugs in the future, the media (61.6 per cent), leaflets/pamphlets (55.7 per cent) and the Internet (54.5 per cent) were again most frequently mentioned. A number of other potential sources were also chosen, including general practitioners and other medical professionals (48.2 per cent), health organisations (44.4 per cent), police and traffic authorities (40.1 per cent), pharmacists (39.0 per cent) and initial driver education (38.1 per cent). Although over one third (37.0 per cent) of respondents reported that they had gained information about drugs and driving through personal experience in the past, only 9.2 per cent cited this as a method they would like to use in the future.

The responses regarding past and future sources of information from drivers who did not report drug driving (n=4768), those who reported driving following

illicit drug use (n=804) and those who reported driving following pharmaceutical drug use (n=884) were also compared. Note that respondents who had reported driving following both illicit and pharmaceutical drug use (n=345) were excluded from this comparison.

As presented in Figure 6.2, “non drug drivers” (n=4768) reported having previously received information about the effects of drugs on driving ability mostly from the media (75.2 per cent), friends (50.6 per cent)

and leaflets/pamphlets (43.4 per cent). Similarly, pharmaceutical drug drivers (n=884) reported having received information about the effects of drugs mostly from the media (newspapers, radio, television: 74.2 per cent), friends (51.9 per cent) and leaflets and pamphlets (47.2 per cent). In contrast, illicit drug drivers were more likely to report getting knowledge and information from personal experience (78.9 per cent), friends (74.3 per cent) and the media (60.1 per cent).

Figure 6.1: Sources of knowledge about drugs (other than alcohol) and driving for all Internet respondents (n=6801)

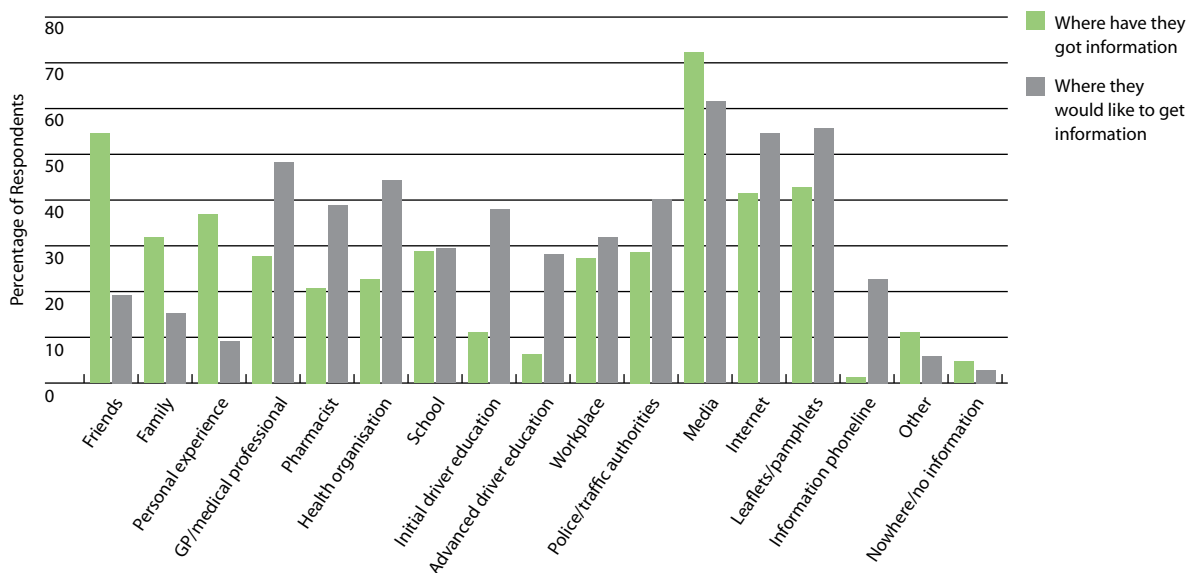
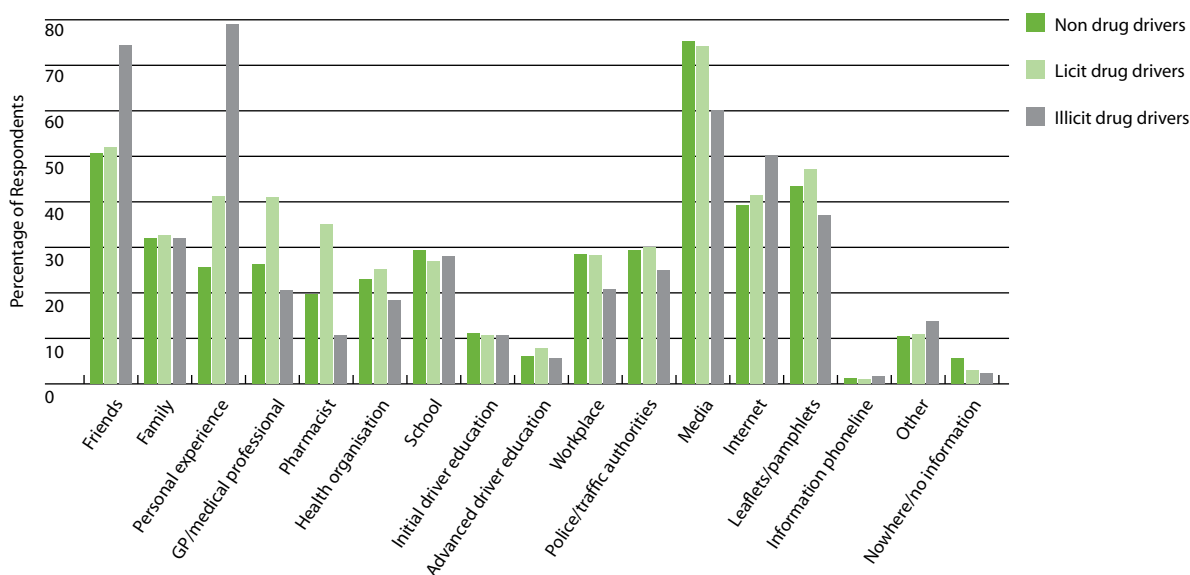


Figure 6.2: Past sources of knowledge about drugs (illicit/licit drug drivers and non-drug drivers)



When asked to consider where they would like to get information and knowledge about drug driving in the future, the most commonly reported sources for non-drug drivers were again the media (65.2 per cent), leaflets/pamphlets (57.1 per cent), the Internet (54.6 per cent) and their general practitioner/medical professional (48.5 per cent). Similarly, for pharmaceutical drug drivers the media (62 per cent), the leaflet and pamphlets (59.2 per cent), their general practitioner/medical professional (56.8 per cent) and the Internet (56 per cent) were also the most commonly cited sources of future information. Finally, illicit drug drivers also reported the Internet (53.7 per cent) the media (48.8 per cent), leaflets/pamphlets (48.9 per cent) and general practitioners/medical professionals (38.7%) as the preferred future sources of information and knowledge.

Driving-related decisions on drugs and driving

One aim of the Internet survey was to collect information regarding the choices that drivers make in relation to driving under the influence. The findings presented in the following section refer to those from the total sample of drivers (N=6801). Respondents who had consumed alcohol, illicit drugs and/or pharmaceutical drugs in the previous 12 months were asked whether they had made the decision not to drive after consuming each substance

and, if they had, what the main reasons were for making the decision not to drive the last time they had done so. In addition, respondents were also asked how likely they would drive under the influence of each substance in the future.

Of the 6231 Internet respondents who reported having consumed alcohol in the preceding 12 months, the vast majority (76.0 per cent) reported that they had made the decision not to drive after drinking alcohol in the previous 12 months. It is important to note that this does not indicate that the remaining 24.0 per cent of respondents had necessarily made the decision to drive after drinking, but rather that they may not have found themselves in the situation of having to make the decision of whether or not to drive after drinking.

Respondents were then asked what the main reasons had been for not driving the last time they had made such a decision. As can be seen from Table 6.1, the most commonly cited reasons given by respondents for not driving after consuming alcohol were that they were worried about the safety of others (51.7 per cent), that their ability to drive had been negatively affected (46.7 per cent), that they were worried about their safety (45.5 per cent) and that they were worried about getting caught by the police (43.3 per cent).

Figure 6.3: Future sources of information about drugs (illicit/licit drug drivers and non-drug drivers)

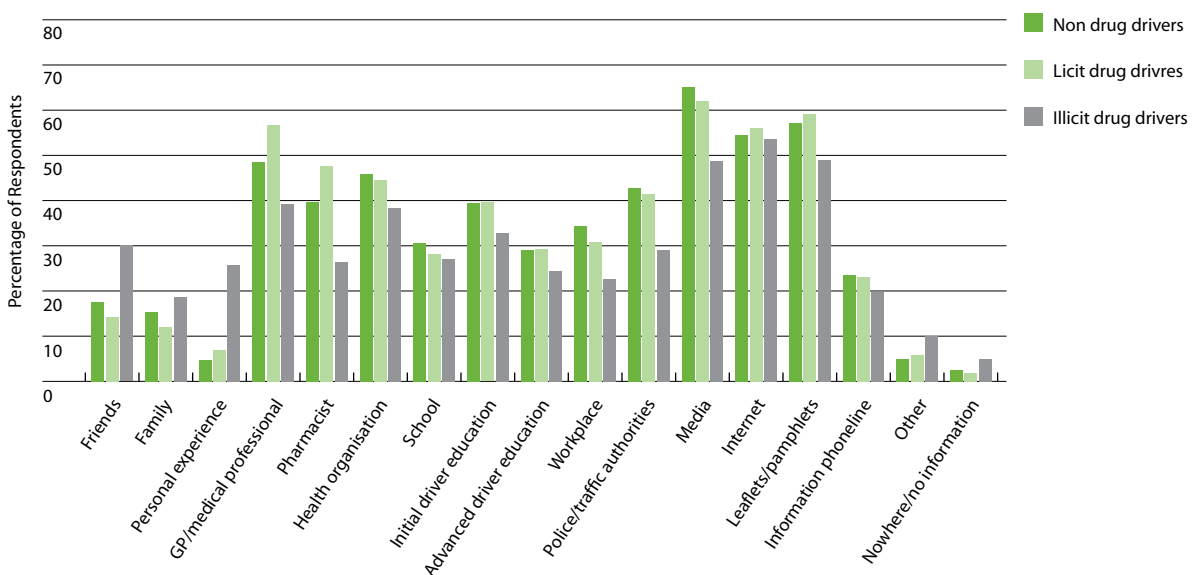
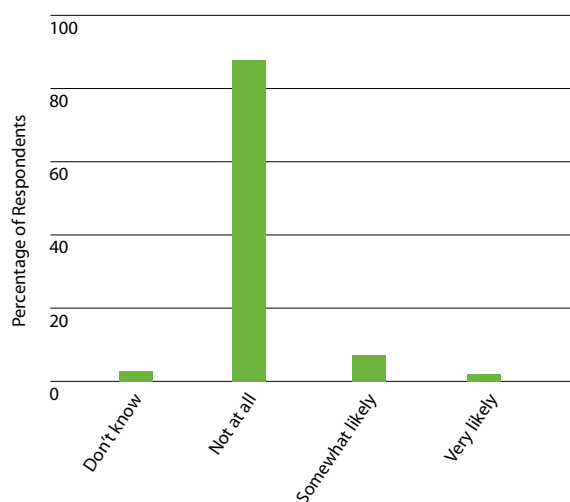


Table 6.1: Reasons for not driving following the consumption of alcohol (n=4731)

	Reason for not driving	
	n	%
Ability to drive was negatively affected	2907	46.7
Worried about getting caught by the police	2696	43.3
Others convinced me not to drive	221	3.5
I was worried about the safety of others	3221	51.7
I was worried about my safety	2838	46.5
Other reasons (unspecified)	567	9.1

Alcohol users were also asked how likely it was that they would drive under the influence of alcohol in the next 12 months. Of those who answered this question (n=6174), the vast majority (87.0 per cent) reported that it was “not at all likely that they would do so” (Figure 6.4). Only a very small proportion of respondents reported that it was “somewhat likely” (7.2 per cent) or “very likely” (2.0 per cent) that they would drive under the influence of alcohol in the next 12 months.

Figure 6.4: Perceived likelihood of driving under the influence of alcohol in the next 12 months



Internet respondents who had used illicit drugs in the previous 12 months were asked whether they had made the decision not to drive following drug use in the preceding 12 months. As presented in Table 6.2, approximately two thirds reported that they had made the decision not to drive following the use of cannabis, ecstasy, LSD/hallucinogens, GHB-type substances and heroin. Again, it is important to note that this does not indicate that the remaining respondents had necessarily made the decision to drive after using illicit drugs, but rather that they may not have found themselves in the situation of having to make such a decision.

Table 6.2: Illicit drug users' response as to whether they had made the decision not to drive following illicit drug use the last time they did so

Drug (number of users who responded to the question)	Respondents who reported that they made the decision not to drive after consumption	
	Number	Percentage
Cannabis (n=1633)	584	35.8
Methamphetamines (n=893)	251	28.1
Ecstasy (n=1056)	410	38.8
Cocaine(n=622)	119	19.1
LSD/hallucinogens (n=367)	140	38.1
Ketamine (n=258)	73	28.3
GHB-type substances (n=133)	48	36.1
Heroin (n=65)	21	32.3

Those respondents reporting having made the decision not to drive following illicit drug use were asked what their main reasons had been for not driving the last time they had made such a decision. As presented in Table 6.3, concern about the safety of others, their own safety and that their ability to drive had been negatively affected were the most commonly cited reasons across the different drug types. Respondents also reported not driving after using methamphetamines (45.4 per cent), ecstasy (41.5 per cent), cannabis (38.5 per cent) and cocaine (38.7 per cent) because they were worried about getting caught by the police.

Table 6.3: Reasons for not driving following the consumption of illicit drugs

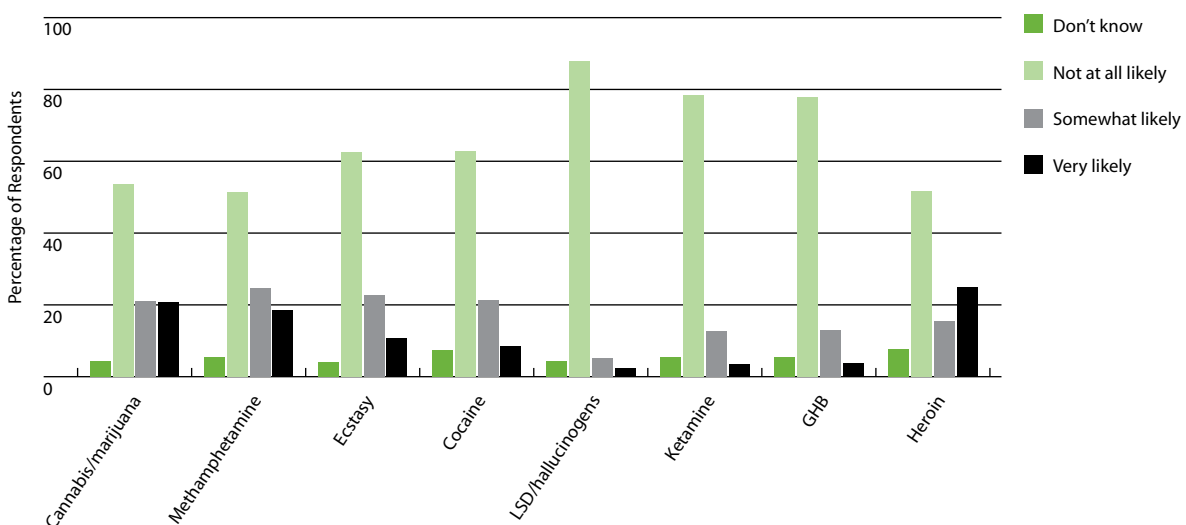
	Cannabis		Meth**		Ecstasy		Cocaine		LSD		Ketamine		GHB		Heroin	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Ability to drive was negatively affected	364	62.3	118	47.0	265	64.6	52	43.7	111	79.3	55	75.3	36	75.0	17	81.0
Worried about getting caught by the police	225	38.5	114	45.4	170	41.5	46	38.7	24	17.1	21	28.8	6	12.5	1	4.8
Others convinced me not to drive	25	4.3	15	6.0	47	11.5	12	10.1	8	5.7	9	12.3	4	8.3	2	9.5
I was worried about the safety of others	328	56.2	125	49.8	253	61.7	60	50.4	98	70.0	44	60.3	29	60.4	12	57.1
I was worried about my safety	289	49.5	113	45.0	243	59.3	56	47.1	91	65.0	41	56.2	29	60.4	10	47.6
Other reason (unspecified)	110	18.8	59	23.5	90	22.0	37	31.1	28	20.0	14	19.2	13	27.1	8	38.1

**Methamphetamines (methamphetamine powder, base and crystal methamphetamine)

Internet respondents who had driven and consumed an illicit drug in the previous 12 months were asked how likely it was that they would drive under the influence of these drugs in the next 12 months (Figure 6.5). In relation to LSD, the vast majority (88.0 per cent) of those respondents reported that they were “not at all likely” to drive following LSD use. Over two thirds of respondents reported that they were “not at all likely” to drive following the use of ketamine (78.0 per cent) or GHB-type substances (77.7 per cent), and slightly less

than two-thirds reported that they were “not at all likely” to drive following the use of ecstasy (62.4 per cent) or cocaine (62.7 per cent) in the next 12 months. Nearly half of the respondents, however, reported that it was “somewhat likely” or “very likely” that they would drive following the use of cannabis (21.0 per cent and 20.9 per cent, respectively), methamphetamine (24.6 per cent and 18.5 per cent, respectively) and heroin (15.0 per cent and 43.0 per cent, respectively).

Figure 6.5: Perceived likelihood of driving under the influence of illicit drugs in the next 12 months



Internet respondents who had used pharmaceutical drugs in the previous 12 months were asked whether they had made the decision not to drive after consuming them within this period of time (Table 6.4). Of those respondents who answered these questions, slightly less than one third reported that they had made the decision not to drive after using analgesics and benzodiazepine in the previous 12 months. Only a small proportion of respondents (17.1 per cent) reported having made the decision not to drive following the use of prescription stimulants during this period of time. Again, it is important to note that this does not indicate that the remaining respondents had necessarily made the decision to drive after using pharmaceutical drugs, but rather that they may not have found themselves in the situation of having to make such a decision.

Table 6.4: Pharmaceutical drug users' response as to whether they had made the decision not to drive following their drug use the last time they did so

Drug (number of users who responded to the question)	Respondents who reported that they made the decision not to drive after consumption	
	Number	Percentage
Analgesics (n=2257)	721	31.9
Benzodiazepines (n=891)	277	31.2
Prescription stimulants (n=332)	59	17.8

Respondents who reported making the decision not to drive following pharmaceutical drug use were also asked what the main reasons had been for not driving the last time they had made such a decision (Table 6.5). Although the most commonly cited reasons for

not driving following the use of analgesics (62.0 per cent) and benzodiazepines (61.7 per cent) was that their ability to drive had been negatively affected, this was less frequently reported as a reason for not driving following the use of prescription stimulants (46.7 per cent). Concern about the safety of others and their own safety were commonly cited as reasons for having made the decision not to drive after using analgesics (57.4 per cent and 54.2 per cent, respectively), prescription stimulants (55.9 per cent and 50.8 per cent, respectively) and benzodiazepines (51.3 per cent and 51.6 per cent, respectively). Only small proportions of respondents reported that they had made the decision not to drive following pharmaceutical use because they were worried about being caught by the police.

Internet respondents who had consumed prescription drugs in the previous 12 months were also asked how likely it was that they would drive under the influence of prescription drugs in the next 12 months (Figure 6.6). Nearly three quarters (70.5 per cent) of respondents reported that they were "not at all likely" to drive following benzodiazepine use. Over half of those commenting in relation to prescription stimulants and analgesics also reported that it was "not at all likely" that they would drive following the use of these drugs in the following 12 months (55.9 per cent and 53.0 per cent, respectively). Considerable proportions of respondents, however, reported that it was "somewhat likely" or "very likely" that they would drive following the use of analgesics (24.1 per cent and 13.6 per cent), prescription stimulants (14.6 per cent and 19.1 per cent, respectively) and benzodiazepines (14.6 per cent and 10.2 per cent, respectively).

Table 6.5: Reasons for not driving following the consumption of prescription drugs

	Analgesics		Benzodiazepines		Prescription stimulants	
	n	%	n	%	n	%
Ability to drive was negatively affected	447	62.0	171	61.7	25	46.7
Worried about getting caught by the police	27	3.7	18	6.5	10	16.9
Others convinced me not to drive	24	3.3	11	4.0	5	8.5
I was worried about the safety of others	414	57.4	142	51.3	33	55.9
I was worried about my safety	391	54.2	143	51.6	30	50.8
Other reason (unspecified)	193	26.8	75	27.1	23	39.0

Roadside testing for drug driving

Internet respondents were asked questions regarding their perceptions and experiences of the range of roadside testing, including RBT for alcohol, RDT for illicit drugs and more general sobriety testing.

Internet respondents were asked whether RBT improves road safety. As presented in Figure 6.7, the vast majority (91.6 per cent) of those who answered this question (n=6771) indicated that they either “somewhat agree” (30.9 per cent) or “totally agree” (60.7 per cent) that RBT

Figure 6.6: Perceived likelihood of driving under the influence of prescription drugs in the next 12 months

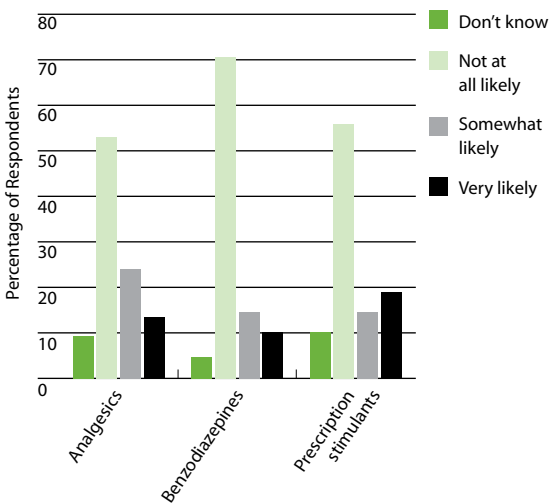
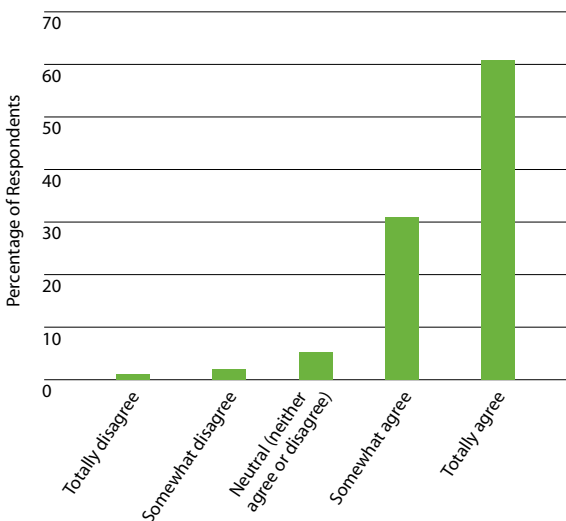


Figure 6.7: Level of agreement with statement that RBT for alcohol improves road safety (n=6771)



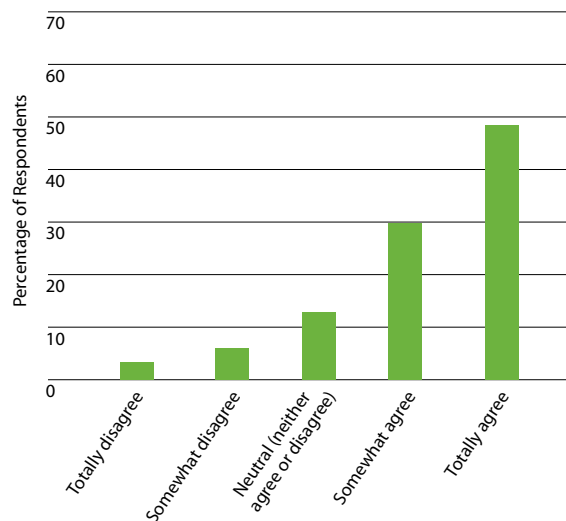
improves road safety. Only 5.2 per cent reported being “neutral” (neither agreeing nor disagreeing).

Nearly two thirds (65.8 per cent) reported that they had been breath tested for alcohol during this period of time. Of these respondents, only a very small proportion (1.2 per cent) reported that they had been found to have a BAC greater than .05 in the past 12 months.

Respondents were asked how likely they thought it was that they would be breathalysed in the next 12 months. Nearly half (49.9 per cent) of those that responded reported that they thought it was “somewhat likely” and approximately one third (34.5 per cent) reported that they thought it was “very likely”. Only 9.5 per cent reported that they thought it was “not at all likely” that they would be breathalysed in the next 12 months.

Internet respondents were asked whether RDT improves road safety. As presented in Figure 6.8, the majority (78.1 per cent) of those who answered this question (n=6781) reported that they either “somewhat agree” (29.7 per cent) or “totally agree” (48.5 per cent) that drug testing improves road safety. A small proportion (12.7 per cent) reported being “neutral” (neither agreeing or disagreeing).

Figure 6.8: Level of agreement with statement that RDT improves road safety (n=6781)



Respondents were asked whether they had been drug tested in this time, with only a small proportion (3.1 per cent) reporting that they had been. Only a very small proportion (2.9 per cent) of drivers that had been drug tested reported that they had tested positive for an illicit substance.

Respondents were also asked how likely they thought it was that they would be drug tested in the next 12 months. Just over one third (35.7 per cent) of those who responded reported that they thought it was “somewhat likely” and a small proportion (5.8 per cent) that it was “very likely”. More than one third (38.0 per cent) reported that they thought it was “not at all likely” that they would be drug tested in the next 12 months.

Finally, respondents were asked about their experiences of sobriety testing. Only a small proportion (0.5 per cent) reported having been sobriety tested (at a police station) in the previous 12 months. Of these, however, more than half (56.3 per cent) were deemed to be impaired. Respondents were also asked how likely they thought it was that they would be sobriety tested in the next 12 months. The majority (87.6 per cent) of those that responded reported that they thought it was “not at all likely”, with 2.6 per cent reporting it was “somewhat likely” and only 0.6 per cent that it was “very likely”.

6.4 Summary and discussion

Road-safety countermeasures are strategies that aim to change risky behaviours (such as driving under the influence of alcohol, illicit drugs and/or pharmaceutical drugs) and to reinforce safe driving behaviours (that is, not driving under the influence of drugs). Evidence from previous research and the key experts who participated in the current study suggests that the most successful countermeasures designed to reduce the incidence of driving under the influence of alcohol are multi-faceted approaches combining detection and law enforcement alongside information and education. The available evidence regarding these approaches in relation to illicit and pharmaceutical drug driving from the three data sources (literature review, expert interviews and Internet survey) are discussed below.

Detection and law enforcement: RBT, RDT and sobriety testing

RBT

Both the literature review and key experts provide considerable evidence that RBT has been effective in reducing drink driving in Australia. Further, findings of the Internet survey provide evidence of the widespread acceptance of RBT in the Australian community, with the vast majority of respondents reporting that they believe that RBT improves road safety. The high profile and visibility of RBT was also illustrated by the finding that many Internet respondents reported that they had been tested in the previous 12 months (although few were found to be over the limit) and most reported that they considered it at least “somewhat likely” that they would be tested in the coming 12 months. It is interesting to note, however, that being worried that they would be caught by the police was only the fourth most commonly cited reason for having decided not to drive under the influence of alcohol in the previous 12 months. The most commonly cited reasons for not driving were related to concerns about safety (others and their own) and impaired driving ability. These findings are discussed further below, when we discuss mass media campaigns.

RDT

Following the success of RBT in reducing drink driving, RDT is now being implemented in Australia as a way to reduce the incidence of drug driving. Saliva testing for the presence of drugs was first implemented in Victoria in 2004, and is now, or is soon to be, implemented across Australia. Key experts in this research noted that there is public support for RDT in the general community, and the findings from the Internet survey support this, whereby the majority of respondents agreed that RDT improves road safety. Although we did find that, when compared to RBT, a higher proportion of respondents reported being neutral or disagreeing that this was the case. This could be for a number of reasons. First, it could be because RBT is in its infancy and has as yet not been extensively rolled out throughout Australia. Second, it could also reflect ambiguity or concerns about the effectiveness of RDT, as expressed by key experts in this research. Indeed,

concerns about the accuracy and reliability of saliva tests have been raised in previous research (Verstraete & Raes, 2006). A number of experts indicated that findings of such research, including the evidence that saliva is not a good measure of impaired driving ability, and that RDT in its current form is costly and therefore not a good investment, were overlooked prior to the introduction of RDT in Australia. Further, despite some key experts reporting complete confidence in the testing procedures currently used in Australia, and although there was general consensus that the tests used are very accurate for detecting methamphetamine, concern was raised as to the high levels of false negatives for cannabis.

In terms of RDT acting as a deterrent to drug driving, previous research has reported conflicting findings. Many of the key experts argued that RDT is an important component of drug-driving countermeasures, as people will only stop if they think there is a chance that they will be caught and penalised. However, the deterrent value of RDT depends on how likely people think it is that they will be tested, with previous research suggesting that people need to perceive that there is at least a 30 per cent chance for it to influence their behaviour (Lenton, 2005). Therefore, the deterrence value of drug driving in the general community could be quite limited by the targeted implementation of RDT. Experts also cited the time-consuming procedures, as well as doubt as to the accuracy of tests, particularly for cannabis, as cause for the deterrence value of RDT to be questioned.

This research found that respondents reported having little personal experience of being tested in the previous 12 months, with significantly fewer reporting being drug tested compared to those who were breath tested. In addition, very few reported testing positive following RDT. These findings are likely to reflect differing stages of RDT implementation at the time of survey. However, we also found that less than half of the sample reported that they think it is at least "somewhat likely" that they will be tested in coming 12 months. Future research, using a similar survey, could monitor not only the rate of being tested, but also whether there is any change in respondents' perception of RDT, in order to ascertain the effectiveness of RDT as a road-safety initiative.

Further indicators of the deterrence value of RDT are the reasons provided by drug users for not having driven within three hours of using an illicit drug. While fewer illicit drug users reported not driving due to being worried about getting caught by the police compared to alcohol users, respondents were more likely to report this as a deterrent for the drugs that can be detected through the saliva tests (that is, methamphetamines, ecstasy and cannabis) and cocaine, than other illicit drugs (LSD/hallucinogens and GHB-type substances). Indeed, similar proportions of methamphetamine users (45.4 per cent) and alcohol users (43.3 per cent) reported making the decision not to drive because they were worried about being caught by the police. This may also be related to the fact that tests for methamphetamines are very accurate and can also detect the drug within 24 hours of its use. A smaller proportion of cannabis users (38.5 per cent) reported making the decision not to drive because they were worried about being caught by the police. It is of interest to note that being caught by the police was much less frequently cited as a reason for not driving following use of LSD/hallucinogens, GHB-types substances and heroin, which are not detected by current RDT procedures. As relatively few respondents answered these questions, these findings must be interpreted with caution. Further, these findings may also be related to the fact that users of these drugs were much more likely to report not driving due to their driving ability being negatively affected following drug use. It may be concluded, however, that RDT seems to be having a deterrent effect for some of the drugs currently being tested. In the context of the current findings, it is also important to note that some key experts stressed the need to remain mindful of the potential unintended consequences of RDT, whereby users could change to drugs that cannot be detected, but that might be more impairing to driving. This needs to be monitored and researched further.

Although these findings indicate that RDT has a deterrent effect for some illicit drug users, it is important to note that illicit drug users are more likely to make the decision not to drive following drug use because of impairing effects and/or concerns about the safety of self or others, than due to police enforcement. We found similar reasons were provided as to not driving by illicit

drug users as by alcohol users. For example, concern about their own safety, the safety of others, as well as that their ability to drive had been negatively affected, were the most commonly cited reasons for both alcohol and the different illicit drug types.

Finally, in relation to RDT, key experts in this research expressed concern that, as alcohol remains a significant road-safety issue, the current raised profile of drug driving and the subsequent focus on RDT, does not divert attention or resources away from RBT.

A number of key experts suggested that the current trials in Australia are not being independently evaluated, nor are they open to public scrutiny. As such, it is crucial that research into RDT needs to be conducted by independent researchers, free from political or commercial influence, so as to ascertain not only the deterrence value but also the cost-effectiveness of RDT. There is also the need to develop improved technology for testing. It is also evident that the drug-driving field needs to openly evaluate and debate the evidence and approaches adopted. However, key experts in this research noted a number of difficulties for this field, including the lack of funding for research as well the concern about appearing critical about what has been implemented and/or appearing “soft on drugs,” particularly in the current political environment.

Sobriety testing

This research found that, although a number of pharmaceutical drugs are implicated in road trauma, key experts highlighted that random saliva testing has not been considered feasible for pharmaceutical drugs, although Tasmania has recently implemented RDT for benzodiazepines. The existing literature, along with the key experts in this research, indicate that the detection and enforcement of pharmaceutical drugs and driving is a very difficult area to address, both politically and practically. First, there is widespread use of pharmaceutical drugs in the Australian community. Second, there are complexities around the treatment of health conditions; for example, medication improves the driving of some drivers, as it can address potentially impairing conditions. Third, it is difficult to distinguish between impairing and non-impairing drugs, similar

drug constituents (for example, opiate-based medicines and heroin), or between drugs that are either prescribed or illicit and/or used appropriately or misused. A further issue is the inability of current testing procedures to distinguish the actual level of use/impairment (that is, they can only detect the presence of a drug, not its impairment). Interestingly, this is also an issue for illicit drugs; however, due to their illicit classification, RDT has been implemented.

Sobriety testing was originally introduced to test for all drugs, and while RDT testing has been introduced for some illicit drugs, sobriety testing remains the means of testing for other drugs, including pharmaceutical drugs. Sobriety testing has a relatively low profile so is unlikely to have a deterrent effect, and experts noted that there is a need to increase awareness of sobriety testing. Indeed, findings from the Internet survey found that only very small proportions of respondents reported having been sobriety tested in the previous 12 months, or believed they would be sobriety tested in the coming 12 months. Of those who did report having been sobriety tested, however, a considerable proportion was deemed to be impaired, providing evidence of this strategy’s accuracy. This finding is consistent with the key expert reports that, although not widely implemented, sobriety testing is an effective strategy in removing impaired drivers from the roads.

Information and education campaigns

According to both the literature review and the key experts interviewed in this research, the two main aims of information and education strategies are to educate the public about the dangers of driving while affected by drugs and to inform the public about detection, enforcement and the potential to be charged. Key experts argued that sustained and integrated information and education initiatives are essential components in influencing attitudinal and behavioural change, and that such campaigns should commence alongside (or, ideally, prior to) the implementation of roadside testing initiatives. Despite this, all of the key experts noted that in Australia, to date, very little has been done in the way of drug-driving related information and education campaigns. In addition,

while there is evidence that information and education campaigns have been very effective components of countermeasures strategies to reduce the incidence of drink driving, particularly in conjunction with widespread RBT, no evaluations of the effectiveness of such strategies for drug driving have been undertaken. Clearly, given the importance of information and education campaigns in the success of drink-driving countermeasures, and given the considerable gap in both the delivery and research and evaluation of drug-driving information and education campaigns, more needs to be done in this area. In addition, considering that alcohol countermeasures, including RBT and education initiatives, took 10 years to have a demonstrable effect on levels of drink driving, RDT is still a very new initiative and it is likely that it will take some time before the true impact of this initiative can be ascertained.

Evidence from drink-driving related campaigns suggest that the most effective campaigns 1) use research evidence and theoretical models to inform the development of specific message and campaign implementation; 2) are implemented in conjunction with detection and law-enforcement strategies, as well as other education and community based programs; and 3) use emotional rather than rational appeals (persuasive and emotional, rather than simply providing information). The question remains, however, as to whether countermeasures adopted for drink driving are directly transferable to drugs other than alcohol and driving. Illicit and pharmaceutical drugs, although for quite different reasons, are not as straightforward. Pharmaceutical drugs, when taken correctly are taken for medical conditions and are prescribed by professionals. As such, there are targeted education initiatives for pharmaceutical drugs. In relation to illicit drugs, while research into drink driving suggests that scare tactics are the most effective, key experts in this research questioned whether such an approach would work with illicit drug use. In addition, while mass media and education strategies have been very effective for alcohol, the message has been more straightforward, particularly as a significantly large proportion of the population drink alcohol. In addition, there is a validated legal blood alcohol level (BAC) that drivers can, in the

main, monitor for themselves. Finally, illicit drug use is an illegal activity and, as such, government/statutory authorities in particular, and the non-illicit-drug using general public, perceive such drug use to be illegal and therefore that people should not be using them, let alone driving under their influence. As a result, there is a polarisation of views from drug-using and non-drug-using populations. This is a challenge to road-safety countermeasures, and cannot be easily addressed with mass media campaigns.

While widespread education initiatives have been implemented for alcohol, it seems that for pharmaceutical and illicit drugs that there is a need for more targeted information initiatives. The following is a discussion of targeted information and education campaigns for pharmaceutical and illicit drug use. However, there is also a counter-argument that, in order to provide a clear and consistent message to the community about drug driving, there is the need for a more general impairment campaign.

Education initiatives specific to pharmaceutical drugs

A range of specific information and education strategies are available regarding pharmaceutical drugs and driving. Such strategies include warning labels on packaging, Consumer Medical Information and verbal advice provided by doctors and pharmacists. The small body of research that has been conducted examining the effectiveness of such strategies, however, suggests that people do not tend to heed such warnings. Key experts also raised that warning labels and Consumer Medical Information are limited in their effectiveness, and as such should not be used in isolation. They also highlighted that while verbal information from doctors and pharmacists can be important in consolidating written warning advice, there are issues as to whether professionals do this, as well as whether patients then comply with the advice, noting that this requires further research. The prescribing of less-impairing drugs and poly-pharmaceutical drug use were also raised as issues to be addressed from the prescribing end, as was the concern that misinformation may lead to patients to stopping the use of their medication, which could have negative health consequences. Experts argued that new ways of disseminating information regarding the

impairing effects of pharmaceutical drugs need to be developed, and that older members of the community should be targeted. Interestingly, this research found through the Internet survey that those who had driven after consuming pharmaceutical drugs preferred the media and leaflets over and above general practitioners and medical professionals as key sources of information.

Education initiatives specific to illicit drugs

This research found a number of issues regarding targeted, illicit-drug education initiatives, including the need for the provision of factual information to specific drug-using groups; the provision of harm-reduction messages; and how to reach particular drug-using populations.

Key experts in this research suggested that illicit-drug education initiatives need to be drug-specific, rather than be “blanket” campaigns. They suggested that targeted education strategies should be factual, credible and congruent with drug-users’ experiences. While they acknowledged that the provision of factual information is an important strategy, some of the key experts highlighted that illicit drugs are complicated, not least by the fact there are so many drugs, as well as the fact that the science is still in its early days as to the impairing effects of different drugs. Despite this, it is evident that, with the growing body of scientific studies, this information needs to be translated, and subsequently disseminated, into information and education resources.

Key experts discussed the importance of providing appropriate messages to illicit drug-using groups. In particular, drug users need harm-reduction information, whereby they are provided with realistic measures to abide by; for example, length of time to wait between drug use and driving. Key experts stressed that a harm-reduction approach is more realistic than only providing abstinence-based, zero-tolerance messages. However, experts noted that there are a number of difficulties in, and barriers to, providing such messages, including difficulties in coming to a consensus regarding what information should be provided (that is, what are safe lengths of time), and political obstacles to providing harm-reduction information in what is essentially a zero-tolerance environment.

This research found that a range of media and sources are necessary to be able to reach the wide range of drug-using groups. The key experts suggested that mass media is necessary to reach the general community. They also suggested more targeted sources, including school/parent education and initial driver education for younger age-groups, as well as the Internet and other new communications technologies (such as Bluetooth). Targeted campaigns for drug-using populations in clubs and pubs included the use of convenience advertising and peer education.

This research also collected data from the Internet survey regarding where respondents reported having received information about drugs other than alcohol. We found that the general population predominantly receives its information from the media (newspapers, radio, television). However, the media coverage of drug driving tends to present sensationalist reporting of drug driving, such as alarmist statistics on drug drivers on the road, and little information and education informing the community of risks. In addition, we found that large numbers of respondents also receive their information from personal experience and/or friends and family, which also is not necessarily a reliable source of information. We found that respondents possibly recognise the limitations of these information sources, and thus they requested information from more reliable sources including health professionals and health organisations, pharmacists as well as the Internet, leaflets and information phone lines. Driver education, both initial as well as advanced, was also deemed an important avenue for imparting information about drug driving.

The responses from illicit-drug users, pharmaceutical-drug users, and non-drug users were examined to see if there were any differences in where they obtained information in the past as well as where they would like it in the future. Respondents who reported having experience of using illicit drugs gained their information from personal experience, as opposed to mass media, which is where prescription and non-users predominantly got their information from. Interestingly, we found that for both the non-drug drivers and drug drivers of both classes of drugs, friends was a primary source of information. However, when asked

for their preferred source of information we found some differences. For example for non-drug drivers and pharmaceutical-drug drivers, while friends were less likely to be selected, the media remained their first choice of information. In addition, it is important to note that while a large proportion of illicit-drug drivers had previously relied on personal experience and friends, they clearly do not want to do so in the future, with the Internet, media, leaflets and pamphlets the most sought-after sources of information for illicit-drug users. It appears from these findings that drug users have less confidence in the media than non-drug users. Young people as well as drug users are increasingly using the Internet to access drug information sites, as well as chat rooms whereby drug users converse with other drug users about their experiences (Miller, Johnston, McElwee & Noble, 2007). Illicit-drug users, in the main, find other drug users to be credible sources of their information.

Mass media: general impairment message

This research found that while there is the need for targeted education initiatives for pharmaceutical and illicit drugs, there is also a case for the delivery of a general mass media information campaign regarding drugs and driving. For example, key experts raised concern for the specific targeting of illicit drug users and argued that, rather than distinguishing between different drugs, there needs to be a uniform approach for all licit and illicit drugs, including alcohol, illicit and pharmaceutical drugs. Key experts suggested that, rather than diverting the attention away from alcohol, it would be beneficial to ride on the success of drink-driving campaigns and incorporate other drugs that impair driving. As such, some of the key experts suggested that the focus of education and information campaigns should be on impairment to driving ability. It was suggested that such an approach may be more likely to be perceived as a genuine attempt to improve road safety, rather than another aspect to the “war on drugs.” However, it is important to note when considering pharmaceutical drugs, that any mass media campaign that includes medicines needs to be mindful of the message it provides, and ensure that the potential risk that patients could stop taking their medicines is minimised, in particular life-supporting medications, or

in the case of some medicines, whereby their driving would be more impaired without their medications (for example, epilepsy).

This research found some interesting findings with regard to choices drivers made in relation to drug driving. The majority of “drug” users, be they alcohol, illicit or prescription users, although to varying degrees, were found to be more likely to report making the decision not to drive following their drug use because they were worried about the safety of others, than for any of the other reasons, including being caught by the police. While the potential influence of social desirability in participants’ responses must be acknowledged, these findings do, nevertheless, have important implications for the formation of mass media road-safety messages. For example, mass media campaigns could build upon drivers’ perceptions of being socially responsible and incorporate these into a core drug-driving message. Future research, in particular qualitative studies, could usefully explore the range of choices drug users make in relation to drug driving, so as to further inform the development of mass media messages for drug driving.

6.5 Conclusion

In conclusion, evidence suggests that the most effective road-safety countermeasures adopt a multi-component approach, including a detection and enforcement approach alongside a range of education and information initiatives. While random roadside testing is currently being implemented for illicit drugs, there is an urgent need for accurate and credible information to be provided to the community regarding illicit drugs. In addition, while there is a range of targeted information initiatives for pharmaceutical drugs, the roadside sobriety testing is not widely implemented, nor is it publicised to the community. This research suggests that there is a need for the provision of consistent messages to the community regarding drugs and driving and, while there is the need for targeted initiatives for specific drug-using populations, these could be supported by well-crafted mass media campaigns that focus on impaired driving and include all drugs, alcohol, pharmaceuticals and illicit drugs.

7

Conclusions, implications and recommendations

Drug driving and associated road-safety implications have received increasing attention from policy makers, researchers and the general community in recent years. There remain, however, numerous gaps in what is known about drug driving in Australia, including the prevalence of drug driving in the general population and within specific drug-using populations; the community's knowledge about drug driving (including the impairing effects and the length of time necessary to wait between consumption and driving); the perceptions of risk associated with drug driving in the general and drug-using populations; and the attitudes and experiences of roadside testing for drug driving.

The aim of the current research was to address some of these gaps through a review of the existing literature, interviews with a range of key experts and stakeholders in the field and an Internet survey of the general Australian population. The research explored these issues in relation to both illicit and pharmaceutical drugs, as well as alcohol, with the aim of contributing to the development of effective countermeasures to improve the safety of Australian roads. In this final chapter, the key findings and conclusions of the research from the three data sources are presented, along with the implications for the development of countermeasures and priorities for future research.

7.1 Limitations of current research

Before turning to the key findings, implications and recommendations, it is important to note the limitations of the current research.

First, the literature review was not intended to be an in-depth analysis, nor a comprehensive review of the existing drug-driving research. Rather, the literature review focused mainly on the Australian research and was designed to inform the development of the key expert interview schedule and the Internet survey

tool. Its purpose was to provide some background and context for the current study.

Key experts from a range of backgrounds and from around Australia were invited to participate in the current research. Although the vast majority agreed to participate, a small number chose not to, so it is possible that not all expert opinion regarding drug driving in Australia was canvassed. A relatively representative group of experts who presented a variety of opinions on the topics discussed were, however, interviewed. It is hoped that the findings from the key expert interviews represent the beginning of a more open debate of the major issues in the drug-driving field.

The findings of the Internet survey must be considered within the limitations of this methodology as a recruitment and data-collection tool (as discussed in chapter 2). In particular, sampling biases are an issue, whereby the sample is limited to those who have 1) knowledge of the survey; 2) interest and motivation to participate; and 3) the ability to participate (that is, access to a computer and the Internet).

Comparison of the demographic characteristics and drug-use patterns of the Internet sample with those of the general population reveal a number of differences. First, consistent with other large-scale surveys (such as the 2004 NDSHS), a higher proportion of females than males participated. Further, the Internet sample was highly educated, consistent with previous research using the Internet as a data-collection tool (Miller et al., 2007). Finally, nearly 40 per cent of the sample worked in either the government or health sector. The levels of recent drug use reported by the Internet respondents were consistently higher than estimates provided for prevalence of drug use in the general Australian community. This is likely to be due to a combination of factors, including the under estimation provided by general-population surveys, the participation in the

current study of members of the community for whom drug driving is a particular interest (that is, drug users) and the potential for higher rates of self-disclosure using the Internet as a survey tool (assuming the participants were confident in the confidentiality and anonymity of this method).

Thus, the Internet sample is not representative of the general Australian population, and care must be taken when drawing conclusions from the data. Nevertheless, nearly 7000 surveys were completed and deemed to be valid (according to the screening process outlined in chapter 2), and represent the largest sample researched, certainly in Australia and to the authors' awareness internationally, in relation to drug driving-related behaviours, attitudes and knowledge.

This research sought to examine prevalence, attitudes and experiences of respondents in relation to the three key pharmaceutical drugs implicated in road safety (benzodiazepines, analgesics and prescription stimulants). Although examples of specific driving-impairing medicines were given, for example, opiate-based analgesics, the respondents in the Internet survey tool were not necessarily referring to the impairing pharmaceutical drugs in their responses. Nevertheless, as there is increasing evidence that pharmaceutical drugs, in particular benzodiazepines, are a serious risk to road safety, this research provides some interesting findings that may contribute to the debate on these issues and the development and implementation of countermeasures, as well as further research that is needed in this area.

A final limitation is related to the definition of drug driving and measurement of impairment. This is not unique to the current research, but rather is an issue and challenge for the wider drug-driving field. Given the differing timeframes and nature of the impairing effects of drugs upon driving ability, it is very difficult to assess the prevalence of impaired drivers in the general community. In an attempt to address this issue, and to gain as accurate a measure of prevalence of impaired driving as possible, the current research sought to measure the levels of participants' driving within three hours of use for illicit and pharmaceutical drugs. As such, the findings need to be interpreted with some caution as the actual level of impairment cannot be determined in research such as this.

The following section draws together the key findings and main conclusions from the current research, along with the implications for the drug-driving field and recommendations for the development of countermeasures and future research. These are presented according to the broad categories of drugs that have been the focus of this research: alcohol, illicit drugs and pharmaceutical drugs.

7.2 Alcohol

Key findings

1. Alcohol remains the drug of most concern in relation to road safety:
 - 12.6 per cent of the total Internet sample reported having driven under the influence of alcohol in the previous 12 months.
 - 13.8 per cent of "recent drinkers" in the Internet sample reported having driven under the influence of alcohol in the previous 12 months.
2. Driving under the influence of alcohol is more common among some sub-groups than others:
 - Male "recent drinkers" are more likely to report driving under the influence of alcohol than female "recent drinkers".
 - Young "recent drinkers" are more likely to report having driven under the influence of alcohol in the previous 12 months than older "recent drinkers".
 - More frequent (daily, followed by weekly) "recent drinkers" are more likely to report having driven under the influence of alcohol in the previous 12 months than less frequent (once a month, or less) "recent drinkers".
3. There is widespread recognition of the effects of alcohol upon driving ability, suggesting that education and information campaigns have been largely successful:
 - Driving under the influence of alcohol is widely perceived as very risky or dangerous.

- There are high levels of confidence in knowledge regarding the impact of alcohol on driving ability, and recognition of the need to wait one to two hours after consuming one standard drink before it is safe to drive.
4. There remains, however, a number of sub-groups of drivers who have not taken on board the drink driving messages:
 - Overall, drinkers are more likely to perceive driving under the influence of alcohol as less risky than non-drinkers.
 - Some “drink drivers”, while being aware of the impairing effects of alcohol on their ability to drive, report driving under the influence of alcohol nonetheless.
 - Further, some “drink drivers” perceive no change in their driving ability, with some even considering that it is improved when they are under the influence of alcohol.
 - There is evidence that polydrug use is associated with greater driving impairment than the use of single drugs, and alcohol is commonly part of polydrug-use patterns. Alcohol, in combination with cannabis or benzodiazepines, is the most dangerous combination, and a considerable proportion of users of these drugs report driving following their use.
 5. RBT has been an effective aspect of campaigns to reduce drink driving in Australia:
 - RBT has widespread community support as a strategy to improve road safety.
 - RBT is a widely implemented general deterrence strategy and has a high profile, with many respondents reporting to have been breath-tested and that it was likely they would be in the next 12 months.
 6. The most common reason participants gave for having made the decision not to drive under the influence of alcohol was concern about their own safety, the safety of others and impaired driving

ability, followed by concern that they would be caught by the police.

Implications for countermeasures and future research

1. RBT needs to be continued to be undertaken and widely publicised.
2. Mass media campaigns should be developed addressing concerns for own safety and the safety of others. It is also important to emphasise the impairing effects of alcohol on driving ability.
3. There is a need for a range of targeted countermeasures, including information and education as well as deterrence and enforcement initiatives for specific alcohol-using groups, particularly males, younger drinkers and frequent (daily) drinkers.
4. There needs to be targeted countermeasures for those caught drink driving, including better coordinated strategies between road-safety initiatives and drug and alcohol services.
5. More research is required, in particular qualitative research, to further understand the characteristics of drink drivers, especially those who continue to drive under the influence of alcohol despite widespread alcohol countermeasures. It is important to understand the factors, including alcohol dependence and other harmful patterns of use (for example, binge drinking), that influence such decisions and the circumstances around such behaviour, in order to inform the development of targeted countermeasures.
6. Further research is also required to ascertain the prevalence and impairment associated with polydrug use, particularly alcohol in combination with illicit and/or pharmaceutical drugs.
7. All countermeasures need to be independently evaluated.

7.3 Illicit drugs

Key findings

1. A considerable proportion of Australian drivers have driven within three hours of using an illicit drug:
 - 16.9 per cent of the total Internet sample reported having driven within three hours of use of any illicit drug in the previous 12 months. However, it is important to note that this is not representative of levels of drug driving in the general population and is likely to be higher given the high level of drug use reported by the sample.
2. There is increasing evidence that illicit drugs impair driving ability and that driving while under the influence of illicit drugs poses a risk to road safety:
 - Impairment research to date is limited and inconclusive, with frequently contradictory findings as to the impact that drugs have on driving.
 - A complex problem for illicit drugs and driving is that, to date, there is no clear definition as to drug impairment. Further, there is a range of confounding factors including dose, tolerance, polydrug use etc.
 - Driving under the influence of illicit drugs is perceived by the general population as very risky or dangerous. However, there are differences between the perceptions of users and non-users, whereby users perceive there to be less risk than non-users. Drug users have varying perceptions as to the impairment on their driving within three hours of drug use.
3. Random drug testing (RDT) has either relatively recently, or is soon to be implemented, in most Australian jurisdictions:
 - The accuracy and deterrence value of RDT has been questioned.
 - The general population sampled in this research tended to consider RDT as contributing to increased road safety.
4. The Australian community is not well informed about illicit drugs and driving:
 - There are generally low levels of confidence in knowledge regarding the impact of illicit drugs on driving ability.
 - Few are able to nominate a “safe” time frame between the consumption of illicit drugs and driving.
5. Few education and information initiatives regarding illicit drug use and driving have been undertaken in Australia. Respondents reported receiving information from a range of sources:
 - The media is one of the main sources of drug-driving information to the general community. This is potentially concerning, considering the sensationalist, and not necessarily accurate, reporting of drug driving.
 - Friends, leaflets/pamphlets and, for drug users, personal experience were other commonly cited sources of information.
 - In addition to the media, friends, leaflets/pamphlets, preferred sources for future information include the Internet and general practitioners/health professionals.
6. The most common reasons participants gave for having made the decision not to drive after taking illicit drugs related to concerns about their own safety, the safety of others and impaired driving ability, followed by concern that they would be caught by the police.
 - While small numbers of drivers have experienced RDT to date, 42 per cent consider it to be at least somewhat likely that they will be tested in the next 12 months. This may reflect the increasing levels of publicity around the implementation of RDT and the change from targeted to more widespread testing.

Implications for countermeasures and future research

1. Further research should be conducted to determine the extent and nature of drug driving on Australian roads:
 - Better techniques need to be developed in order to gain an accurate indication of the prevalence of drug-impaired driving. Future research needs to use these methods to gain a more rigorous measurement of impairment alongside prevalence data.
 - Further research needs to be conducted to examine drug driving on Australian roads at the general population level. For example, questions regarding drug driving should be added to routinely collected, population-level surveys, such as the NDSHS.
 - Research examining whether illicit drug users are changing their patterns of use to include drugs that cannot be detected using current RDT methods needs to be conducted
 - Further research (including further analysis of the current data), could usefully examine gender differences in relation to perceptions of impairment and risk associated with illicit drugs and driving.
 - In-depth qualitative research, needs to be undertaken to further understandings of drug-driving behaviours within specific drug-using groups. For example, examination of the knowledge levels as well as the perceptions of those who drug drive and their perceptions of the risk and impairment would be useful.
2. Given the conflicting evidence about illicit drugs and driving, there is a clear need for further research into the impairment associated with the different illicit drugs on driving:
 - Research could be conducted that compares the actual impairment to driving performance by the different illicit drugs, alongside drivers' perceptions of the effect. Findings of such research could be used to inform the development of evidence-based information and education resources targeted to drug-using populations.
3. RDT:
 - It is crucial that there is independent evaluation and academic scrutiny of research into RDT, including the accuracy of testing procedures; the effectiveness of RDT in reducing the number of impaired drivers on the road; and the cost-effectiveness of such initiatives. There needs to be an open debate to consider the evidence from all sides.
 - If RDT is to adopt a general deterrent approach, it needs to be broadened from the more targeted testing in entertainment precincts and along truckers' routes, and be implemented and publicised more widely alongside RBT.
 - Further research is needed to ascertain why Internet respondents show some reserve as to the effectiveness of RDT. For example, further research comparing drug users' versus non-drug users' perceptions of RDT. In addition, it is also important to monitor any change over time with further roll out of RDT around Australia.
4. Given the low levels of knowledge about illicit drugs and driving, there is a clear need for education and information of the Australian community, through the use of mass media as well as the targeting of specific drug-using groups:
 - Road-safety countermeasures need to focus on the impairment associated with drug use, and not drug use *per se*. Consistent messages need to be provided to the broader community about drug-impaired driving, and should include all classes of impairing drugs, including illicit drugs, alcohol and the impairing pharmaceutical drugs.
 - There is a clear need for commitment from the range of stakeholders with remits in road safety and drug education, to implement sustained,

widespread information and education campaigns, in order to inform the community about drugs and driving. Coordinated and consistent messages should be delivered through mass media campaigns as well as through targeted initiatives to drug-using populations.

- Education and information initiatives need to be disseminated via a range of sources, including mass media and more targeted to drug-using populations.

Given that the media is one of the main sources of drug-driving information to the general community, it is necessary to engage the media to disseminate information regarding the complexities of this issue, with a focus on impairment by the range of impairing substances, including alcohol, illicit and pharmaceutical drugs.

More detailed information needs to be disseminated to specific drug-using populations. This information needs to be based on reliable, accurate and the best available scientific evidence as to how drugs impact on driving, and should include non-sensationalised messages. Initiatives need to adopt a harm-minimisation approach, with a focus on preventing drug-impaired driving, not drug use *per se*. They need to ensure that existing perceptions of drug users (that is, subjective experiences and perceptions of impairment) are taken into account. A focus could be to inform drug users of the difference between scientific impairment and the subjective perceptions commonly held by drug users. Caution needs to be applied in the use of “scare tactics” and/or the insensitive provision of information counter to drug-users’ own experiences.

This information needs to be disseminated by means of a range of credible sources, including the Internet, peer education, leaflets and pamphlets, general practitioners and health professionals. A multi-pronged approach to disseminate information in a range of media, including the Internet, youth-friendly formats

and disseminated through a range of settings including driver education, schools and families, raves and clubs.

- Finally, as drug-driving information and education countermeasures are in their infancy, there is a need to ensure they are evaluated.

7.4 Cannabis

Key findings

1. Cannabis is one of the illicit drugs of most concern from a road-safety perspective:
 - 12.3 per cent of the total Internet sample reported having driven under the influence of cannabis, comparable to the proportion reporting having driven under the influence of alcohol.
 - Over half (51.3 per cent) of the cannabis users in the Internet sample reported having driven within three hours of cannabis use in the previous 12 months.
2. Some sub-groups of cannabis users are more likely to drive within three hours of cannabis use than others:
 - Males are more likely to report driving within three hours of cannabis use than females.
 - Driving within three hours of cannabis use was not restricted to young users/drivers; instead, it was spread across the age groups, possibly reflecting relatively widespread use in the general community.
 - More frequent cannabis users (that is, daily, followed by weekly) are more likely to report having driven within three hours of cannabis use in the previous 12 months than less frequent users (that is, once a month or less).
3. The evidence regarding cannabis-related driving impairment is inconclusive:
 - There is evidence that cannabis impairs driving, whereby drivers are more likely to hit obstacles, miss signs, or drive slower. In

contrast, there is also evidence that driving ability is not dramatically impaired, with drivers compensating by slowing down and maintaining greater distances between cars.

- Cannabis users' perceptions of impairment reflect the inconsistencies in this research, whereby over half reported that there had been no change in their driving ability the last time they drove within three hours of cannabis use.
4. Cannabis was the illicit drug least likely to be perceived by the total sample of drivers as being very risky or dangerous to drive within three hours of use:
 - Nevertheless, two thirds of the total Internet sample still thought it was very risky/dangerous.
 - There were marked differences between the risk perceptions of users and non-users, with less than one third of users reporting that driving within three hours of using cannabis is very risky or dangerous.
 5. RDT for cannabis:
 - There is a need to improve the accuracy of roadside saliva tests, or else run the risk of undermining RDT as an effective deterrence strategy for cannabis.
 6. When compared to other illicit drugs, the community is relatively well-informed about cannabis and driving:
 - More than half of the total Internet sample reported knowing a little, and more than one third reported knowing a lot, about cannabis. However, these findings need to be interpreted alongside the finding that personal experience was the main source of information for illicit drug users.

Implications for countermeasures and future research

1. Countermeasures need to target specific groups of cannabis users, particularly males and those

consuming weekly or more often. As with alcohol, it is likely that weekly or daily users are dependent upon cannabis to some degree, and therefore a broader strategy addressing such patterns of use, such as treatment of cannabis dependence, is needed rather than simply focusing on road-safety implications.

2. Further research is needed into the nature and extent of the impairing effects of cannabis upon driving ability:
 - Research is needed regarding the impairment associated with the common combination of alcohol and cannabis.
 - Research needed to determine how long after using cannabis it is "safe" to drive.
 - Findings of such research needs to be disseminated to cannabis users.
3. Further research, in particular qualitative research, examining cannabis users' knowledge levels as well as their perceptions of impairment and risk, is needed to inform the development of relevant and appropriately targeted countermeasures.
4. Education and information initiatives for cannabis need to be disseminated via a range of sources including mass media and more targeted towards cannabis users:
 - Given the high prevalence of cannabis use in the Australian community, mass media campaigns educating and informing the general community about cannabis (and how it impairs driving) are warranted.
 - Education targeting cannabis users needs to take into account the perceptions and experiences that users draw from, otherwise run the risk of being dismissed. The aim needs to be to inform cannabis users of the difference between the scientific evidence of impairment compared to subjective perceptions. There is a need to challenge the perception that users are able to compensate for effects of cannabis on their driving performance.

- There is a need to provide cannabis users with harm-minimisation advice, including how long after use it is safe to drive.
5. RDT:
- The accuracy of saliva tests for cannabis needs to be improved.
 - The community's experience of testing, including the rate of false negatives, needs to be monitored, as well as the deterrence value of RDT for cannabis-impaired drug driving.

7.5 Methamphetamines

Key findings

1. Methamphetamines are of concern from a road-safety perspective:
 - 6.9 per cent of the total Internet sample reported having driven within three hours of using methamphetamines in the previous 12 months.
 - Over half (52.7 per cent) of the methamphetamine users in the sample reported having driven within three hours of using methamphetamines in the previous 12 months
2. In contrast to alcohol and cannabis, there were less specific sub-groups for methamphetamine users.
 - Males and females are equally likely to report having driven within three hours of methamphetamine use.
 - A greater number of frequent (daily or weekly) users reported having driven within three hours of using methamphetamines in the previous 12 months than less frequent (monthly or less) users.
3. The evidence regarding methamphetamine-related driving impairment is complex:
 - Higher doses and in the acute stage (that is, immediately after consumption) is associated with increased risk-taking behaviour.
 - Rebound fatigue, during the "comedown", is also associated with significant risk to road safety.
 - Small doses may improve performance on some simple driving tasks via improved concentration, heightened alertness and sharpened reflexes. Importantly, these predominantly simple tasks are not comparable to "real life" driving situations.
 - Perceptions of impairment among methamphetamine users reflect the apparent inconsistencies in the research, where over half reported that there had been no change in their driving ability the last time they drove within three hours of methamphetamine use, and approximately one quarter reported that it had improved their driving ability.
4. Driving under the influence of methamphetamines is generally considered to be risky:
 - Most of the total sample considered it to be very risky or dangerous to drive within three hours of using methamphetamines.
 - However, there was a marked difference between users' and non-users' risk perceptions, with less than one third of methamphetamine users reporting that driving within three hours of using methamphetamines is very risky or dangerous. It could be that methamphetamine users are basing their perceptions on their personal experiences, whereby they have perceived an improvement in their driving ability via subjective increased alertness/ability to focus.
5. RDT:
 - Roadside saliva testing for methamphetamines is highly accurate.
 - Being caught by the police was a more commonly cited consideration for methamphetamine users than for those using drugs not detectable by current RDT.

6. There are generally low levels of knowledge regarding methamphetamines and driving:
 - Approximately two thirds of the total Internet sample reported they knew at least a little about the impact of methamphetamines on driving ability.
 - The majority reported that there needs to be a period of at least 10 hours before it is safe to drive following methamphetamine use. It is important that further research and/or analysis of this data is undertaken, to examine the levels of knowledge of methamphetamine users who report driving within three hours of use and those who do not.

Implications for countermeasures and future research

1. There is a need for specific countermeasures targeting methamphetamine users, in particular, frequent regular users of all ages, and both males and females.
2. Further research is needed examining the nature and extent of the impairing effects of methamphetamines upon driving ability. The findings of such research need to be used to inform the education of methamphetamine users:
 - There is a need to research and understand the subjective perceptions and the actual impairments around increased alertness/ improved driving ability, rebound fatigue risk and risky driving. Such research should have a particular focus on the perceptions of those who drug drive and whether there are differences associated with different patterns of use (for example, occasional versus dependent use).
 - Research needs to determine how long after using methamphetamines it is safe to drive.
3. Further, in-depth qualitative research examining methamphetamine users' knowledge levels and perceptions of impairment and risk is needed to inform relevant and appropriately targeted countermeasures.
4. Education and information initiatives on methamphetamines need to be disseminated by means of a range of sources, including mass media and as well as targeting to methamphetamine users:
 - Given the relatively high prevalence of use in the Australian community, the general community needs to be informed about methamphetamines and driving.
 - Education initiatives need to target methamphetamine users, in particular frequent users.
 - Education targeting methamphetamine users needs to take into account the perceptions and experiences from which users draw, otherwise run the risk of being dismissed. The aim needs to be to inform methamphetamine users of the differences between the scientific evidence of impairment and subjective perceptions. A more complex message on the impairment associated with methamphetamines needs to be developed, including that while there might be the subjective feeling of increased alertness, there are risks to road safety, including increased risk taking and rebound fatigue.
 - There is a need to provide users with harm-minimisation advice, in particular how long after use it is safe to drive.
5. RDT:
 - There is a need to evaluate the impact of RDT on prevalence of methamphetamine-impaired driving.
6. Given the high prevalence of methamphetamine use and driving within particular sub-populations, including truck drivers and clubbers, additional structural interventions need to be implemented:
 - Improved transport workers' schedules.
 - Improved transport options for ravers/clubbers.

7.6 Other illicit drugs

Key findings

1. There is increasing evidence regarding the impairing effects of ecstasy upon driving ability.
2. Younger ecstasy users were more likely than older ecstasy users to report having driven within three hours of ecstasy use.
3. While a third of ecstasy users reported no change to their driving, approximately half did report experiencing impairment.
4. Hallucinogenic drugs (ketamine, GHB and LSD) were more likely than other illicit drugs to be perceived as impairing driving.

Implications for countermeasures and future research

1. Education initiatives need to reinforce the experiences of users of these drugs and need to target younger ecstasy users.

7.7 Pharmaceutical drugs

Key findings

1. Pharmaceutical drugs, particularly benzodiazepines, are a potential concern from a road-safety perspective:
 - 15 per cent of the total Internet sample reported having driven within three hours of using analgesics in the previous 12 months.
 - 44.8 per cent of analgesic users in the sample reported having driven within three hours of using analgesics in the previous 12 months.
 - 4.0 per cent of the total Internet sample reported having driven within three hours of using benzodiazepines in the previous 12 months.
 - 30.3 per cent of benzodiazepine users in the sample reported having driven within three hours of using analgesics in the previous 12 months.

- 2.3 per cent of the total internet sample reported having driven within three hours of using prescription stimulants in the previous 12 months.
 - 43.0 per cent of prescription stimulant users in the sample reported having driven within three hours of using analgesics in the previous 12 months.
2. Some benzodiazepine users are more likely to drive with three hours of use than others:
 - Although more females in the sample reported having used benzodiazepines in the previous 12 months, male users were more likely to report having driven within three hours of using benzodiazepines.
 - No particular age group was found to be more likely to report having driven within three hours of benzodiazepine use.
 - Daily benzodiazepine users were more likely to report driving within three hours of benzodiazepine use than weekly or monthly users.
 3. Pharmaceutical drugs are perceived to be less impairing to driving ability than alcohol and illicit drugs.
 - The majority of users reported that there had been no change in their driving ability the last time they drove within three hours of use.
 - Of the pharmaceutical drugs, benzodiazepines were more likely to be perceived as impairing.
 - Prescription stimulants were more likely to be reported as improving driving ability.
 4. There is considerable uncertainty regarding perceptions of risk associated with pharmaceutical drugs and driving:
 - They are often not perceived at all as risky; however, non-users are more likely to perceive high levels of risk.

- They are generally perceived to be less risky in terms of driving ability than alcohol and illicit drugs. Of the pharmaceutical drugs, benzodiazepines are considered most risky.
5. Although there is increasing evidence that some pharmaceutical drugs, in particular benzodiazepines, are implicated in a considerable proportion of road accident and trauma, the general community is uninformed about pharmaceutical drugs and driving.
 - Much of the information regarding pharmaceutical drugs and driving is provided to users at the point of dispensing through warning labels on packets, Consumer Medical Information and verbal information provided by pharmacists and doctors.
 - However, it is unclear, how consistently such information is provided and/or adhered to.
 6. There are a number of additional factors that need to be taken into account when considering the issues around pharmaceutical drugs and driving:
 - There are many different types of pharmaceutical drugs and doses.
 - An important consideration when examining driving and pharmaceutical drugs is that, when taken according to prescription, such drugs may have a medicinal benefit that could in fact result in improved in driving ability.
 - It is possible that, following regular stable use, tolerance develops, which may be associated with a reduction in the impairing effects on driving ability.
 - The drugs may be used according to prescription, prescribed but not used according to prescription, or used illicitly (without prescription).
 7. Pharmaceutical drug users reported making the decision not to drive following use for a wide range of reasons:
 - Large proportions of pharmaceutical drug users reported making the decision not to drive following use because their driving was impaired, or due to concern for the safety of themselves and others.
 - Only a small proportion of pharmaceutical drug users reported that being worried about being caught by police was a major consideration in their decision not to drive.
 8. The main law-enforcement strategies targeting pharmaceutical drug driving is sobriety testing:
 - Evidence suggests that sobriety testing is an effective means of getting impaired drivers off the road.
 - The deterrent effect of sobriety testing is limited, given that it is targeted, and not widely implemented.
 - While only a very small percentage of respondents reported being sobriety tested, there was a very successful rate of detection compared to random procedures of drink driving and illicit-drug driving. Respondents reported that they perceived it to be very unlikely to be tested in the future.

Implications for countermeasures and future research

1. Further research should be conducted to determine the extent and nature of pharmaceutical drug driving on Australian roads.
 - Better techniques need to be developed in order to gain an accurate indication of the prevalence of pharmaceutical drug-impaired driving. Future research needs to utilise methods able to gain a more rigorous measurement of impairment alongside prevalence data.
 - There is a need for more research to examine pharmaceutical drug driving on Australian roads at the general population level. For example, questions regarding pharmaceutical drug driving should be added to routinely collected population-level surveys, such as the NDSHS.

- There is a need for more research to examine pharmaceutical drug driving within specific groups. For example, the gender differences in terms of propensity to drive within three hours of using benzodiazepines (that is, to ascertain why more males take drugs and drive).
 - Issues around whether pharmaceutical drugs are being used according to prescription, or without a prescription, and the impact upon driving ability and road safety, requires further investigation.
2. As many pharmaceutical drugs have the potential to impair driving ability, it is crucial that further research is conducted to ascertain reliable and accurate data as to the impairing effects of pharmaceutical drugs. These findings will contribute to the development of evidence-based, education and information countermeasures.
- It is important that independent research examines the impact that different pharmaceutical drugs have on driving performance.
 - Such research would necessarily take into account dosing and the development of tolerance, in order to provide meaningful and accurate guidelines for consumers.
3. There needs to be a multifaceted approach to pharmaceutical drugs and driving, including mass media messages about all drug-impaired driving; targeted information and education for pharmaceutical users; as well as the wider implementation of detection and law enforcement strategies for pharmaceutical drugs.
4. Law enforcement countermeasures:
- Sobriety testing needs to be continued and, if possible, implemented more widely. This is particularly important, given that this law-enforcement strategy targets impaired driving, rather than the use of drugs *per se*. However, it should be noted that the procedures can be extremely time consuming and costly and thus their cost-effectiveness needs to be determined.
 - The potential for detection and enforcement of pharmaceutical-impaired driving needs to be more widely publicised to the general community.
 - There is a need to evaluate the current implementation of saliva testing for benzodiazepines in Tasmania, not only for its accuracy but also its effectiveness in lowering numbers of impaired drivers from the road.
 - In addition, there is a need to ascertain whether there are any unintended consequences for patients regarding their continued use of medication.
5. Given the low levels of knowledge about pharmaceutical drugs and driving, there is a clear need for education and information initiatives for the community about pharmaceutical drugs and driving, including mass media and targeted to users of pharmaceutical drugs:
- There is a need for commitment from the range of stakeholders with remits in road safety and drug education, to implement sustained, widespread information and education campaigns.
 - Given that the media is one of the main sources of drug-driving information to the general community, it is necessary to engage the media and educate them regarding the complexities of issues concerned with pharmaceutical drug driving.
 - Mass media campaigns should provide consistent messages about drug impairment to the wider community, including all drugs, pharmaceutical alongside alcohol and illicit drugs. Mass media messages about pharmaceutical drug driving could usefully focus upon impairment to driving ability and concerns about safety of self and others.
 - Any education initiatives about pharmaceutical drugs need to be sensitively implemented to ensure that patients who drive do not stop

taking medicines to the detriment of their health. There is a need to encourage a dialogue with doctors and pharmacists.

- In addition to the media, friends and leaflets/pamphlets, preferred sources for future information include the Internet and general practitioners/health professionals.
 - There is a need to evaluate the current targeted-education initiatives for pharmaceutical drugs, in terms of how consistently such information is provided and/or adhered to.
 - It is possible that procedures need to be improved to ensure that professionals are competent, and accountable, in disseminating the information about pharmaceutical drugs and driving.
- Male benzodiazepine users are a perhaps unexpected group that needs to be targeted for information.
6. The non-prescribed (or illicit) use of pharmaceutical drugs is an additional challenge:
- This may be addressed, at least to some extent, by the implementation of mass media campaigns and the broadening of public campaigns to inform the community of sobriety testing.
 - Further research is needed examine the illicit use of pharmaceutical drugs (for example, within populations of injecting drug users) to inform the development of more targeted countermeasure strategies.

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