New Zealanders' attitudes towards drug-driving and suggested countermeasures

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Abbreviations and acronyms

BAC	blood alcohol concentration
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
GHB	gamma-hydroxybutyric
SADD	Students Against Drink Driving

Definitions

Randomised roadside testing – breath testing for the presence of alcohol at the roadside

Randomised roadside drug testing (RDT) Queensland, Australia – roadside drug testing allows police to conduct saliva testing in conjunction with random breath testing (RBT) or as a stand-alone check

Roadside screening test (New Zealand) – empowers police officers to require those not able to complete the compulsory impairment test in a satisfactory manner to provide a blood sample for analysis

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Executive summary

There is some limited but growing research to indicate that drug-driving in New Zealand is an emerging road safety problem.

Consistent with overseas research, alcohol is still the major drug involved in driving under the influence statistics, but the emerging pattern shows that driving after taking other drugs is becoming more frequent and the preference for particular drug types is becoming more consistent. In all studies published since the 1990s, there has been a trend towards a gradual rise in the number of people driving under the influence of drugs. The drug most frequently used before driving, after alcohol, is cannabis.

The overall aim of this research was to provide a drug-driving demographic profile of New Zealanders and to make recommendations for possible countermeasures, based on the outcomes of telephone and internet surveys with the general population and face-to-face surveys with drug users. Specifically, the aim of the study was to better understand the relationship between drug use, its impact on driving and the associated road safety risk.

The drug-driving profiles of the general population and of specific drug user groups were assessed to understand the prevalence of drug-driving, driver behaviour, driver risks, risk exposure and potential countermeasures to deter drug-driving.

The information was gained from 1000 telephone survey subjects, 241 internet subjects and 196 face-to-face interviews with drug users from the four main drug user groups. Participants in the last group were almost all from the prison population and most were male. The results from the different groups indicated different risk profiles and perceptions of driver risk.

The results of the study indicated that a total of 47% of respondents in the general population surveys said they drove after drinking or using drugs. The overwhelming majority of those respondents (80%) who admitted to drink/drug-driving only drank alcohol. A total of 9% of respondents from the general population (but only 2% of those surveyed by telephone) said they drove under the influence of social and recreational drugs. The remainder of the general population used a combination of alcohol and drugs.

All participants in the face-to-face interviews admitted to drug-driving. A total of 79% had been involved in at least one crash and of these 57% reported they were at fault. A total of 80% of the group also had a previous driving conviction. In addition, almost half of the entire sample had been passengers with drink/drug drivers.

The overall results indicated that alcohol still represents a sizable concern for road safety practitioners. In the general population, drivers reported sometimes using cannabis and, to a lesser extent, other prescription drugs before driving. The face-to-face group, who used drugs habitually, presented a different profile from the general population. Alcohol, cannabis and mixed drug use were reported by those drivers. This group poses a separate challenge for road safety practitioners.

Those questioned about their view of the risk associated with cannabis, both from first-hand experience and from observation, reported that this drug caused fewer issues than alcohol. A sizable proportion of the sample stated they believed it actually improved driving performance.

The prevalence of cannabis use was more notable in the younger profile of the population, and the proportion of those driving with prescription drugs increased significantly in the age groups 46 years and above. With an increasingly aging population, the use of prescription drugs is likely to grow and have the potential to impact on driving behaviour.

The study identified that the majority of people who drove while under the influence of illegal drugs had also consumed alcohol. In turn, this indicates that the majority of drug drivers would be captured through existing mechanisms to manage drug-driving in New Zealand.

The people surveyed and interviewed in this process were asked to identify from a list of potential countermeasures which would be most likely to discourage them from drug-driving. Although there are legal processes and definitions of some of the measures identified in the survey, they were given the opportunity to share their perception, rather than refer to these legal definitions. The study findings indicated that the general population felt the presence of randomised on-road testing for drug use, enforcement and penalties such as vehicle impoundment and loss of licence would be the most effective measures to deter drug-driving. The face-to-face group of habitual drug users also indicated that randomised on-road testing for drug use and vehicle impoundment would deter drug-driving. This group's responses differed from those of the general population, with the fear of being caught a major deterrent.

A key finding from this study was that only 32% of the people in the face-to-face interview held a full licence, compared with 90% of the general population. This may account for the fact that getting caught was more of a concern for the face-to-face group and presents a challenge for enforcement agencies to identify and track these drug drivers.

The report recommends further research into the driving ability and competence of drug users and the development of programmes to reduce risky driving by habitual drug users. Further research on the associated risk and driver behaviour of people taking a combination of prescription drugs would assist to influence future transport policies and road safety campaigns.

Abstract

This study conducted in New Zealand in 2012 investigated the attitudes, prevalence, habits and self-reported risks associated with drug-driving, along with possible countermeasures. Telephone and internet surveys were used for a general population sample. Face-to-face interviews, mainly in prisons, surveyed habitual users of four main drug types: alcohol and other drugs, cannabis, methamphetamine and benzodiazepine.

Alcohol was the main substance used before driving, followed by alcohol and cannabis together and cannabis alone. Nearly half the general population respondents had driven after taking drugs or alcohol and a sizable proportion after taking drugs other than alcohol.

Many respondents in the face-to-face group said they took risks when driving. Only a third had a full licence despite driving for more than 10 years. The majority had been involved in a crash, more than half being at fault.

Countermeasures preferred by both the general population and the habitual drug users included randomised roadside testing, vehicle impoundment and enforcement. Social media was considered effective by the general population but not by the face-to-face group. Recommendations include research into the effects of drugs on driving and the development of programmes to reduce risky driving by drug users.

1 Introduction

In New Zealand, concern about the role of drugs in driver impairment and traffic crashes has increased over the last decade. With greater understanding about the relationship between drug-driving and road safety, the impact of drugs on road safety is now at a stage where road safety promoters, educationalists and those charged with enforcement are motivated to look at this issue. They wish to understand the countermeasures needed to deal with what is considered an established and growing problem.

In New Zealand there is some limited but growing research on this topic. To date the findings indicate that New Zealand's issues to a large extent mirror those discussed in overseas research (Fergusson and Horwood 2001; Blows et al 2005; Fergusson et al 2008; Hammond 2009; Poulsen 2010).

A number of overseas reviews on the topic of drug-driving have reported that depending on the method used to collect the sample data, there will be a range of responses associated with the variety of individuals who take drugs and drive (Scheers et al 2006). This has tended to cloud the information available and leads to discussion on how to deal with specific problems or groups. The information on how to deal with the population as a whole tends not to be clear or consistent.

However, the emerging pattern shows that drug-driving is becoming more frequent and the preference for particular drug types more consistent. In all studies published since the 1990s, there has been a trend indicating a gradual rise in the number of people driving under the influence of drugs. The drug most commonly used, after alcohol, has become cannabis.

While there are issues around the comparability of data collected in different ways, the various methods indicate that of those stopped at roadside surveys about 1% to 2% of drivers tested positive for drugs. Those involved in surveys conducted by interview, or questionnaire, report drug-driving at 3.4%. When the collection method becomes more targeted, with methods using urine samples, the rate rises to between 6.4% and 12%.

In studies where samples were only collected on weekend nights, results are at the 15% level. In studies focused on drivers stopped on suspicion of alcohol or drug use, it is usual to find a higher rate of drug-driving than from those reported at roadside surveys.

Regardless of the collection method, it is clear that drug-driving occurs and more importantly this is emerging as a road safety risk that deserves attention.

While the effort to reduce drink-driving has had considerable effect, the attempts to manage and change the incidence of drug-driving are fraught with difficulties. The problems include issues around the types of drug used and the associated risk when driving.

1.1 Purpose of the study

The purpose of this study was to understand the nature of driving under the influence of drugs (drug-driving) in New Zealand and to understand how this impacts on driving and the associated road safety risk. To achieve this goal, the study objectives were to:

- gain a better understanding of the prevalence of drug-driving in New Zealand (working with a general population profile and habitual drug users)
- measure the perceived level of risk associated with drug-driving
- understand the countermeasures that would dissuade the New Zealand population from drug-driving.

Information on the level of drink-driving within the sample set was also gathered as part of the survey methodology, so that the relationship between drink-drivers and drug-drivers could be analysed.

2 Literature review

2.1 The prevalence of drug-driving

While there is substantial evidence of a direct causal relationship between alcohol and driving impairment (Barbone et al 1998; Kelly et al 2004; Longo et al 2000b; Movig et al, 2004; Neutel 1998; Ogden and Moskowitz 2004; Papafotiou et al 2005a; Ramaekers et al 2000; Ramaekers et al 2004a; Ronen et al 2008;,Shinar 2006), less is known about the impact of other drugs, both licit and illicit, on driving performance (Henry-Edwards 2004; Shinar 2006).

Drug-impaired driving has become an issue of increasing public concern, and there are a growing number of publications attempting to develop an understanding about these concerns and issues. Studies from Canada, Europe, Australia, Scotland, USA, South Africa and New Zealand are forming the basis of a consistent body of information that indicates that drugs may be found in 10% to 32% of fatally injured drivers (Raes et al 2008; Longo et al 2000a; Bernhoft et al 2005; Kintz et al 2000; Mura et al 2003; Assum et al 2005; Sukhai 2004; Lowenstein and Koziol-McLain 2001; Soderstrom et al 2001; Walsh et al 2005).

The drugs most commonly present in these studies are cannabis, benzodiazepines (minor tranquillisers) and cocaine. In 2002, 18% of Canadians surveyed reported driving within two hours of taking some type of medication or other drug that could potentially affect their ability to drive a vehicle safely. In 2009, a roadside survey in Canada indicated that 10.4% of drivers tested positive for drug use, 8.1% of drivers had been drinking, 15.5% of drivers tested positive for alcohol, drugs or both. In this case, cannabis and cocaine were the drugs most frequently detected in drivers (Beirness and Beasley 2009).

There is also evidence to suggest that the prevalence of drug-driving in Australia has increased in recent years (De Gier 2000; 2004; Drummer et al 2004), which appears to be a worldwide trend, (see also Longo et al 2000a; Bernhoft et al 2005; Kintz et al 2000; Mura et al 2003; Assum et al 2005; Sukhai 2004; Lowenstein and Koziol-McLain 2001; Soderstrom et al 2001; Kotsos et al 2003; Maes et al 2003; Raes and Verstraete 2005; Lillsunde 2000; Pepin et al 1999; Toennes et al 2005; Thorsdottir et al 2004; Wennig 2005; Smink et al 2001; Christophersen 2000; Zorec-Karlovsek et al 2003; Ceder 2000; Jones 2005; Augsburger et al 2005; Plaut and Staub 2000; Walsh et al 2005; Raes et al 2008).

In a 2004 Australian study (Walsh et al 2004), samples taken over a 12-month period indicated drug use as 91.6% alcohol, 24.0% cannabis, 13.2% methamphetamines and 4.1% benzodiazepines. In an associated study when asked about drug use when driving, a sample of 6801 internet respondents reported drug-driving use as 12.6% alcohol, 12.3% cannabis, 6.9% methamphetamines and 4.0% benzodiazepines.

The results of roadside surveys from Australia (Aitken et al 2000; Darke et al 2004; Jones et al 2005; Lenne et al 2001); Canada (Dussault et al 2002); Denmark (Behrensdorff and Steentoft 2003); two in the Netherlands (Assum et al 2005; Mathijssen 1999); Norway (Assum et al 2005); the UK (Glasgow) (Assum et al 2005); and the USA (Lacey et al 2007) indicate there are some similarities between these countries in drug-driving.

In most of these studies, the drug most frequently detected in the general driving population is cannabis. However, in Australia, methamphetamine is more prevalent than in other countries (P Swann, personal communication, quoted in Raes et al 2008).

Benzodiazepines are the second most prevalent drug/medicine found in drivers in Canada, Denmark and the Netherlands (Beirness 2005; Behrensdorft 2003; Bernholf 2005), and Norway (Assum et al 2005). In

the study conducted in the USA (Jones et al 2003), cannabis was the most prevalent drug, followed by cocaine and amphetamines.

The 2009 New Zealand Drug Foundation study (Hammond 2009), which included in-depth interviews with 12 key experts from around New Zealand with knowledge and experience of the drug and alcohol and/or road safety sectors, and an internet survey of 1164 New Zealanders, found driving under the influence of cannabis was the most common drug-driving behaviour (24.5% for internet respondents). However, they advised caution with these results because people who used drugs were over-represented in the sample compared with estimates of the rates of drug use in New Zealand's general population. This suggested the findings might have over-estimated incidences of drug-driving in the general driver population.

There is a consistent theme running through all the research indicating that illegal, prescription and over-the-counter drugs all have the potential to impair driving ability; however, the use of cannabis, the most widely used drug after alcohol, poses a lower risk of impairment than alcohol. The research indicates that individuals under the influence of cannabis may be able to compensate for impairments while driving for short periods of time. However, they may be less able to compensate for impairments when driving is monotonous or prolonged, or in situations that require greater attention and skill (Marquet et al 1998; Morland 2000; Risser et al 1998; Verstraete and Puddu 2000; Walsh et al 1997; Menetrey et al 2005; Ramaekers et al 2006; EMCDDA 1999).

In addition to overseas studies, the evidence from Ministry of Health (2010) household survey indicated that the number of people using drugs in New Zealand was also consistent with overseas research. In the survey, 6784 New Zealanders aged 16 to 64 years reported having used drugs for recreational purposes, in the following order of popularity:

- cannabis (46.4%)
- benzodiazepines and party pills (13.5%)
- LSD and other synthetic hallucinogens (7.3%)
- amphetamines (7.2%)
- kava (6.3%)
- ecstasy (6.2%).

The people questioned reported their use of drugs for recreational purposes over the previous 12-month period as follows:

- cannabis (14.6%)
- benzodiazepines and party pills (5.6%)
- ecstasy (2.6%)
- amphetamines (2.1%)
- LSD and other synthetic hallucinogens (1.3%).

2.2 Drivers killed in traffic crashes

The results of a number of epidemiological studies, reviewed by Raes et al (2008), indicate that 11 studies have been published since 1999 investigating the presence of alcohol, drugs and/or medicines in drivers killed in traffic crashes. These were one in Australia (Drummer et al 2004); one in Canada (Brault et al 2004); one in France (Mura et al 2003); one in Hong Kong (Cheng et al 2005); two in Italy (Sironi et al

1999; Vignali et al 2001); two in Spain (del Rio et al 2002; Lopez-Rivadulla and Cruz 2000); one in Sweden (Holmgren et al 2005); one in the UK (Assum et al 2005) and one in the USA (Logan and Schwilke 2004).

> *Alcohol was the most frequently detected psychoactive substance in drivers killed in accidents. However, drugs were also frequently detected, and just as in injured drivers, at a higher rate than in the general driving population.*
>
> *The combination of alcohol and drugs was also present in a substantial number of samples, ranging from 2.5% to 17%. In five of the above studies, cannabis was the most prevalent drug, with a maximal value of about 29% in the study in France. In this study, however, only drivers younger than 30 years were included, which may partially explain the high number of cannabis-positive samples.* (Raes et al 2008).

A study by Poulsen (2010) in New Zealand indicated that from an analysis of blood samples from 1046 deceased drivers, 546 (52%) were *not* impaired by alcohol or other drugs. Five hundred (48%) of the deceased drivers had alcohol or other drugs in their blood that may have impaired their ability to drive safely. From the total sample, 135 used alcohol alone (27% of the possibly impaired drivers); 96 used cannabis alone (19% of the possibly impaired drivers); 142 used a combination of alcohol and cannabis, but no other drug (28% of the possibly impaired drivers); 127 used some other combination of drugs, many including alcohol and/or cannabis (25% of the possibly impaired drivers).

2.3 Drivers involved in traffic crashes

Raes et al (2008) also provided information from four studies of drivers involved in traffic crashes published since 1999: three in France (Laumon et al 2005; Pepin et al 1999; 2003) and one in Greece (Maravelias 2003).

The data from these studies is in agreement with the findings from the studies of drivers injured or killed in traffic accidents. Alcohol was more prevalent than any other psychoactive substance; cannabis was the most prevalent after alcohol (however, the studies in France did not test for benzodiazepines, and benzodiazepines were as prevalent as cannabis in Greece); and the combination of alcohol and drugs was detected in a substantial number of samples (Raes et al 2008).

2.4 Drivers suspected of driving under the influence of drugs

Raes et al (2008) also noted there were 15 studies published since 1999 of drivers stopped on suspicion of drug use: one in Australia (Kotsos et al 2003); two in Belgium (Maes et al 2003; Raes and Verstraete 2005); one each in Finland (Lillsunde 2000); France (Pepin et al 1999); Germany (Toennes et al 2005); Iceland (Thorsdottir et al 2004); Luxembourg (Wennig 2005); the Netherlands (Smink et al 2001); Norway (Christophersen 2000); Slovenia (Zorec-Karlovsek et al 2003), and two studies in both Sweden (Ceder 2000; Jones 2005) and Switzerland (Augsburger et al 2005; Plaut and Staub 2000).

These studies revealed wide variations in the number of drug-positive samples found on suspicion (55% to 99%). They believed this reflected differences in methodology, and also differences in procedures used to detect drivers who might be under the influence of drugs.

The main findings were:

In all the studies where samples were tested for alcohol and drugs, a psychoactive substance other than alcohol was most frequently detected, except in one study in Switzerland (Plaut and Staub 2000) in which alcohol was the most prevalent. This was probably due to the very low cut-off level used to detect alcohol (BAC >0.1%).

Cannabis was the most frequently detected psychoactive substance in eight studies. In both Swedish studies, amphetamines were the most frequently encountered drug. Jones (2005) remarked that this had been so for several decades. In the Netherlands, cocaine was the most prevalent drug, followed closely by benzodiazepines. Smink et al (2001) remarked that the situation in the Netherlands was different from that in neighbouring countries, where cannabis was the most frequently encountered drug in impaired driving and traffic accidents. In France and Germany, cannabis was the most frequently used substance, but samples were not tested for the presence of benzodiazepines. Cannabis was also the most prevalent drug in Norway, but samples were not tested for cocaine.

In the Australian study, blood samples were only collected from drivers who had failed the field sobriety test. As drugs were found in 99% of the blood samples, Kotsos et al (2003) concluded that the field sobriety test [a behavioural impairment test] used in the study was an effective initial method for detecting drug use.

In Sweden, an increase in the prevalence of amphetamines and cannabis was detected after the implementation of new zero tolerance legislation for narcotic drugs, while there was no change in the prevalence of therapeutic drugs. According to Ceder (2000), this may be because police in Sweden were allowed to carry out eye examinations on drivers following the change in legislation, as amphetamines and cannabis have a pronounced effect on pupil size and reaction to light (Raes et al 2008).

2.5 What are the specific effects of drugs on driving?

Due to the current drug-driving behaviour trends observed worldwide and in New Zealand, the present study focused on the effects of drug-driving in relation to four classes of drugs: alcohol, cannabis, benzodiazepine and methamphetamine.

The literature review and driver survey set out to confirm the noted effects of each drug class, particularly in relationship to the driving task and to assess participants' perceptions of risk and impairment.

The following sections comment on the effects of each of the four classes of drugs.

2.5.1 Alcohol

Alcohol is a central nervous system depressant. Many studies have already been performed to determine the effects of acute alcohol ingestion on cognitive functions and driving performance. These studies found that numerous driving-related skills are degraded beginning at low blood alcohol concentration (BAC). Several skills have been shown to decrease with increasing BAC, such as prolongation of reaction time performance and lowering of coordination performance. The evidence of alcohol in crash rates is widely accepted and this report does not intend to provide a comprehensive review.

2.5.2 Cannabis

Cannabis users feel euphoria, relaxation and increased social interaction, with frequent laughing. They experience changes in perception (visual, audible, sensory, or time perception). The users are aware of the effects of the drug, and this awareness increases with higher doses. Cannabis acutely reduces some

cognitive and psychomotor skills such as learning, equilibrium, coordination, tracking ability, memory, perception, motor impulsivity and vigilance. These effects are mostly dose dependent (Menetrey et al 2005); (Ramaekers et al 2006).

Cannabis can also have an effect on behaviour. The influence of cannabis on human risk taking is unclear. The results of experiments in laboratory settings are contradictory. In some driving studies (with rather low doses) users are aware of the impairment and often compensate their driving style by driving more slowly, overtaking less, or keeping greater distances from other vehicles. Nevertheless, the driver is still unable to compensate completely for the loss of capability in some psychomotor skills (Sexton et al 2000).

Some negative effects of cannabis appear to be additive or even synergistic with those of alcohol, and the combination of both substances results in a prolongation as well as enhancement of their effects.

Driving studies revealed that drivers under the influence of both alcohol and cannabis were less attentive to traffic approaching from side streets, while the use of either cannabis or alcohol (at low doses) had no effect (Lamers et al 2001). The combination of cannabis and alcohol generated an additional decrement in control of lateral deviation on top of the decrement caused by either cannabis or alcohol (Sexton et al 2002). The detrimental effects of other drugs such as cocaine can also be reinforced by additional intake of cannabis (Foltin et al 1993).

2.5.3 Benzodiazepines

Benzodiazepines are used primarily to relieve anxiety, although some are used to treat other conditions such as insomnia, alcohol withdrawal symptoms, muscle spasms, panic disorders and seizure disorders (Jones et al 2003).

The most common side effect of benzodiazepines is sedation. Other potentially driver impairing side effects may include blurred vision as well as burning and tearing of the eyes, dizziness, weakness, clumsiness and unsteadiness or ataxic gait.

Benzodiazepines that sustain their effects (and their side effects) for more than nine hours are called long half-life benzodiazepines. Examples of long half-life benzodiazepines include alprazolam (Xanax®), chlordiazepoxide (Librium®), clorazepate (Tranxene®), diazepam (Valium®), lorazepam (Ativan®), oxazepam (Serax®) and prazepam (Centrax®).

Shorter half-life benzodiazepines include estazolam (ProSom®), flurazepam (Dalmane®), quazepam (Doral®), temazepam (Restoril®) and triazolam (Halcion®).

The duration of hypnotic effect and the profile of unwanted effects may be influenced by the distribution and elimination half-lives of the administered medication and any active metabolites formed. When half-lives are long, the medication or metabolite may accumulate during periods of nightly administration and be associated with impairments of cognitive and motor performance during waking hours. If half-lives are short, the medication and metabolites will be cleared before the next dose is ingested and carry-over effects related to sedation or central nervous system depression should be minimal or absent. Berghaus and Friedel (1997) and Jones et al (2003) analysed the percentage of studies that showed impairment in driving-related psychomotor and perceptual tasks as a function of time since administration of certain benzodiazepines.

Their findings are summarised below.

- Clobazam (at 10mg or 20mg) and temazepam (10mg) generally yielded no significant impairments at all.

- Studies with midazolam, diazepam, oxazepam, triazolam, and lormetazepam showed impairments for five to six hours.
- High-dose long-life benzodiazepines showed significant impairments lasting up to 18 to 24 hours. This included nitrazepam (10mg), flunitrazepam (2mg), and flurazepam (30mg).

Furthermore, benzodiazepines or active metabolites with very long elimination half-lives can accumulate with chronic dosing and produce prolonged effects, especially in elderly or obese patients, or those with liver disease, or with concurrent use of other medications that compete for hepatic oxidation.

Deleterious effects of benzodiazepines on a wide variety of driver performance tasks have been demonstrated. Simulator and driving studies have shown that a single dose of diazepam (Valium) decreases a driver's ability to maintain vehicle lane position. Drivers' eye-hand coordination, reaction times, ability to perform multiple tasks and retrieve information were also impaired (Couper and Logan 2004).

Subjects' on-road driving performance the morning after using benzodiazepines as hypnotics (sleeping pills) showed impairment comparable to a BAC of 0.05% to 0.10% (O'Hanlon et al 1986). New Zealand's current BAC limit for drivers over the age of 20 is 0.08%.

In Leroy and Morse's (2005) research, drivers taking benzodiazepines were twice as likely to have a motor vehicle crash (OR=2.0) as drivers not taking these medications.

In an elderly driver test group (age 67 to 84 years), during the first seven days of exposure to a long half-life benzodiazepine, there was an almost 50% increase in the rate of involvement in injurious motor vehicle crashes compared with a group of age-matched controls who had no exposure to benzodiazepines in the previous year (Hemmelgarn et al 1997).

The risk remained significant (although somewhat reduced) for continuous use of longer duration, up to one year. In contrast, no increased risk was observed after the initiation of treatment with short half-life benzodiazepines for the first seven days of use, or over longer durations of use.

Walsh et al (2004) state that based on the present knowledge, benzodiazepines constitute a considerable risk to traffic safety, both in therapeutic doses and to a much larger degree at higher doses. When evaluating the driving risk for benzodiazepines, it is also important to consider the high prevalence of benzodiazepine use among the elderly (Hemmelgarn et al 1997).

2.5.4 Amphetamines

Amphetamine causes a strong central stimulation and euphoria. Users think they can do anything and will take more risks. In addition, amphetamine widens the pupils (mydriasis) and reduces sleepiness leading to insomnia, but after some time (hours or days depending on the pattern of use), the subject is exhausted and falls asleep (crash phase).

Amphetamine can improve some cognitive functions such as divided attention performance and verbal interaction (Mills et al 2001). However, tests in driving simulators reveal that the intake of amphetamine causes a decrease in overall simulated driving by inducing problems such as incorrect signalling, failing to stop at a red traffic light and slowing reaction times. The decrease in simulated driving ability is only observed during daytime, which is consistent with the tunnel vision associated with amphetamine consumption (Mills et al 2001; Silber et al 2005). It is also important to note that the doses of amphetamine administered in these experimental studies were very low (10–30mg) and thus not representative of the doses that are generally taken by abusers (100–1000mg/day) (Couper and Logan 2004).

Studies investigating the effect of amphetamine in sleep-deprived persons revealed a positive effect on psychomotor functions (Wesensten et al 2005; Caldwell and Caldwell 1997). The effects of amphetamine on cognitive functions in sleep-deprived persons are less obvious. Both positive and negative effects, as well as no effects have been assessed (Mills et al 2001; Wesensten et al 2005).

Methamphetamine like amphetamine is a central nervous system stimulant that may cause restlessness, euphoria, dizziness, dysphoria, tremor and insomnia. Ecstasy (methylenedioxymeth(yl) amphetamine, MDMA, XTC) is a 'designer' amphetamine, indicating that it is synthesised to resemble the effects of amphetamine. It causes a weaker stimulation of the central nervous system than amphetamine, but it can also cause sensory disturbances, nausea, dizziness, ataxia, muscular rigidity, sweating, restlessness and tremor.

Ecstasy causes acute decreases in attention, short- and long-term memory, verbal memory, visuospatial skills, executive functioning and prediction of object movement under divided attention (Lamers et al 2003; Ramaekers et al 2004b; Smith et al 2006).

It also leads to improved psychomotor performance on a battery of tests, such as movement speed and tracking performance in a single, as well as in a divided attention task (Lamers et al 2003). Tests in driving simulators, however, revealed that the intake of ecstasy can decrease performance by increasing speed and speed variation, and inducing problems in car following, while some tasks are not influenced (reaction time, lateral control) and may even be improved (eg lateral control).

Other psychoactive substances such as alcohol can reinforce the deleterious effects of ecstasy and cause some additional negative effects (Brookhuis et al 2004). On the other hand, the use of ecstasy can diminish some, but not all detrimental effects of alcohol, while other negative effects of alcohol can be reinforced (Ramaekers et al 2004b).

During the crash phase following the use of amphetamines, the subject feels very tired, unable to combat sleep and is depressed. This phase can last for several days (Verheyden et al 2003).

3 Methodology

The overall aim of this research was to better understand the drug-driving demographic profile of New Zealanders and the perceived risk of drug taking, and to be able to make recommendations for possible countermeasures. The study purposely aimed to solicit user attitudes and perceptions, rather than undertaking quantitative studies to assess the actual risk of driving under the influence of drugs.

To achieve this, the researchers set out to establish a baseline understanding of the drug-driving demographic and to assess the particular aspect of this with four known drug-driving groups.

Overall the methodology was developed in three stages as outlined below. The survey questions and methodology outlined in this paper were approved by the Ethics Committee and the Prison Service.

Part 1 – Survey of the general population

- To use a telephone survey to assess the level and type of drug use in the New Zealand population.
- To use an internet survey method to assess the level and type of drug use in the New Zealand population.
- To use the results of the surveys to assess the level of drug use and drug-driving in New Zealand.

Part 2 – Face-to-face interviews with known drug users

- To carry out in-depth interviews with drug users to find out about their driving habits and level of impairment when driving. These interviews provided an understanding of the attitudes and behaviours that could respond to countermeasures when dealing with drug impairment and driving.

Part 3 – Reporting

- To compile the results of these interviews and from them recommend a number of countermeasures to inform educational and enforcement programmes, and to make recommendations for future policy.

3.1 Survey of general population

Part one of the study involved the design and administration of two questionnaires to assess drug-driving issues in New Zealand for the general population. The survey was conducted first by telephone and second through social network sites on the internet. The two questionnaires aimed to achieve the following outcomes:

- information on the prevalence of drug- and drink-driving in the surveyed population
- identification of the classes of drugs used by drivers
- an assessment of the level and severity of road safety risk associated with drug type, drug combination and drug levels
- participants' recommendations for countermeasures relating to enforcement, education and future policy.

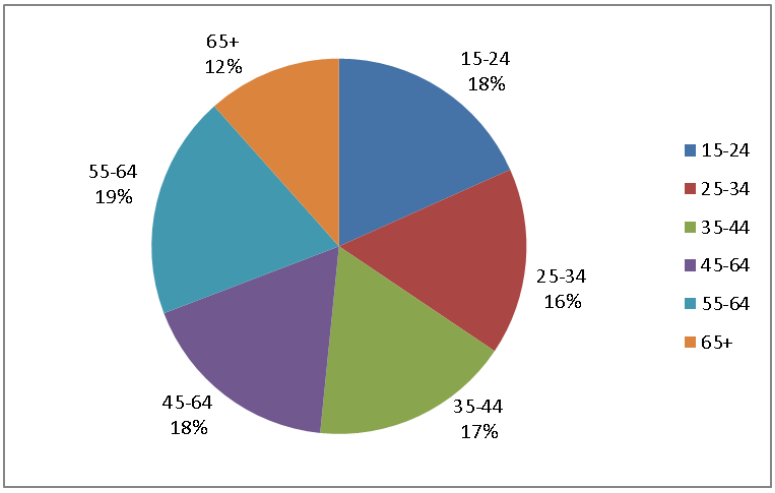
A more detailed breakdown of the methodology is provided in the remainder of this section.

3.1.1 Telephone survey methodology

The survey covered both urban and rural New Zealand and targeted a comprehensive sample based on age and social status but not geography. The process was to interview 1000 people by telephone and to invite

as many as possible internet social network users to engage in an on-line survey. The survey was undertaken to ensure that the data set would be comparable to the national age profile. The national age profile is presented in figure 3.1.

Figure 3.1 National age profile – national population estimates 2011



Source: NZ Statistics 2012

The telephone surveys were conducted between September and December 2011 by a specialist tele-marketing company. The telephone random sample was obtained using data from a randomised number generating programme from an external provider. The research team called numbers in sequence as generated to eliminate the risk of interviewers avoiding or favouring a particular area or prefix. No compensation was offered to those taking part in the survey.

Although the survey was completed by hand, it was subsequently entered into Survey Monkey by the surveyor.

3.1.2 Internet survey methodology

The internet survey was developed using Survey Monkey and was launched just before Christmas 2010 using Facebook and invites via email to existing user groups. The survey was available for completion until June 2011. The invitations to participate were sent out to:

- road safety coordinators
- friends of the research team on Facebook (in excess of 600 people)
- Beca staff.

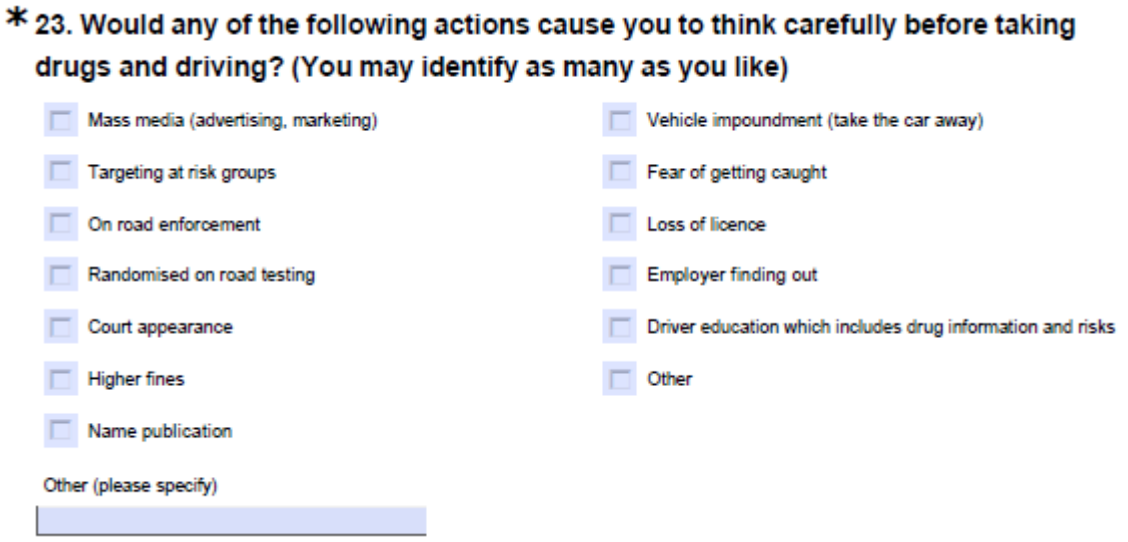
Although self-reporting has some disadvantages, it did allow the survey to be disseminated to a larger proportion of the community and to engage with a younger profile of the population. A prize was offered to people as an incentive to complete the survey.

3.1.3 Survey design and analysis

The surveys were all designed on Survey Monkey and were subject to testing prior to completing the user surveys.

For the purposes of the survey a number of assumptions were made for the countermeasures. The survey did not reference the legal definition of random roadside drug testing or vehicle impoundment. The respondents were able to draw their own conclusions of what these measures involved.

Figure 3.2 Countermeasures included in the study



The primary aim of this question was to understand which measures were likely to dissuade people from drug-driving. For the purposes of this study, the group surveyed was not provided with a specific definition of random roadside drug testing or vehicle impoundment. The basic concept of being stopped at the roadside and a vehicle being taken away was considered to be sufficient as a description/concept for the general public to understand.

As with the other measures in the lists there are legal definitions and processes required to implement roadside drug testing and vehicle impoundment, which must be considered in a policy context before these measures can be considered as a deterrent.

3.2 Face-to-face interview methodology

The second part of the research was to conduct in-depth face-to-face interviews with habitual drug users.

The reason for this was that previous research had shown quite different profiles for drug-driving and the assessment of associated risks between the general population and habitual drug takers.

The variations in many of the key findings relate to the difference between the general population and the 'drug culture'. The published epidemiological studies give quite a different profile depending on the group. For example, daytime random roadside surveys may show a prevalence of 1%, through to questionnaire surveys of young chronic drug users that may indicate a prevalence of 85%.

For this reason a more intensive questionnaire was developed to include a number of self-report questions to assess the behavioural and risk factors apparent in habitual drug users when driving under the influence of the main drug classes. In the lead-up to the study, a wide range of drug types was assessed for their impact on driving, with alcohol combined with drugs, cannabis, benzodiazepines and methamphetamines rated the most prevalent in New Zealand. Most of the subjects for this survey were recruited through the prisons, with a few in the benzodiazepine group recruited through medical practices and a drug rehabilitation programme.

These habitual drug users included 50 people in each drug category group. They were engaged in an in-depth assessment of their drug use and driving.

The process and outcome for the second part of the research was to:

- assess four main drug user groups for their drug taking and driver behaviour, risk exposure and road safety risk severity.
- develop some behavioural and impairment data on the impact of drugs on driving, in particular:
  - alcohol and other drugs
  - cannabis
  - benzodiazepines
  - methamphetamine.

Respondents in the main drug category groups were interviewed mainly from a prison population. In order to be part of the interview process they were screened by the Department of Corrections. They had to have a 'drug and alcohol issue/problem' as assessed by the Department of Corrections alcohol and drug assessment process. No participants were compensated for taking part in the survey.

These participants, a total of almost 200 people, were targeted based on their alcohol and drug history. They had to have had a drug-driving experience before they came to prison and be able to recall the events and experiences from that time.

A few participants in the benzodiazepine group were recruited through medical practices and invited to take part in the study by their doctor, and a few were referred by the programme director from a drug rehabilitation programme.

3.2.1 Countermeasures

The countermeasures evaluated in the face-to-face interviews were the same as those referenced in the telephone and internet surveys.

3.3 Final reporting

Following the data collection and analysis, the results of the study presented a profile of New Zealanders and their views on the:

- prevalence of drug-driving in New Zealand
- perceived level of risk associated with drug-driving
- identification of the countermeasures that would dissuade the New Zealand population from drug-driving.

3.4 Methodology limitations

The internet survey was added to the original scope of the survey to provide a more enriched data set. The response was lower than that of other similar studies. Improvements could be made to increase the survey response rate by:

- reducing the length of the survey
- engaging with a wider circulation list (including existing driver associations/groups and university students)
- circulating the survey through existing community groups

- engaging with freight companies.

It is acknowledged that the responses to the survey would have potentially been over exaggerated by prison inmates and under reported by the general population. This is considered one of the key methodological issues with this type of study. The bias will always occur when asking people about their perceptions and habits concerning sensitive issues in this type of survey. To decrease and/or understand the bias and without undertaking measures to test drug-driving behaviour, which would have their own methodological and ethical approval issues, we recommend a number of additional measures to further investigate drug use and behaviour:

- Increase the sample size.
- Use focus groups – facilitated by somebody the participants trust.
- Give clear messages about how this information will be used and stored.

4 Key findings from the research

4.1 Introduction

The study methodology involved a range of data collection processes.

First, the following data analysis represents the results of telephone and internet surveys, which were conducted between October 2010 and April 2011. These surveys were conducted to investigate the 'general population's' view of drug-driving.

In addition, a more detailed interview process targeting known drug users (both legal and illegal) was undertaken between April and May 2012. This group is referred to as the face-to-face group. Most of these subjects were selected based on the alcohol and drug screening test by the Department of Corrections (see section 3.2).

A total of 1470 responses were received. Table 4.1 shows a breakdown of the distribution of the surveys.

Table 4.1 Drug study survey sample size

Survey method	Sample size	Description
Telephone survey	1000	A random telephone survey of the general population
Internet survey	274	An internet-based survey developed and distributed via email and Facebook.
Face-to-face group	196	Interviews with people having a history of drug taking in four main face-to-face groups using prison populations and a few respondents from medical centres and drug rehabilitation programmes.
Total sample size	**1470**	

The internet-based survey tool 'Survey Monkey' was used to input all data from each of the surveys. The results of the survey were analysed according to the following key research topics:

- survey participant profile
- prevalence of drug-driving
- understanding the risks
- identification of countermeasures.

The results of the study give profiles of the general population and the face-to-face group. Further analysis has been undertaken to identify the profile of the subjects by age across each of the key research topics identified above.

4.2 Survey participant profile

The following section outlines the demographic profile of all survey respondents.

4.2.1 Age

Figure 4.1 provides an outline of the age groups who completed the telephone and internet surveys. Only 4% of the respondents did not respond to this question, which provides a representative sample set.

Figure 4.1 Age of telephone and internet survey respondents

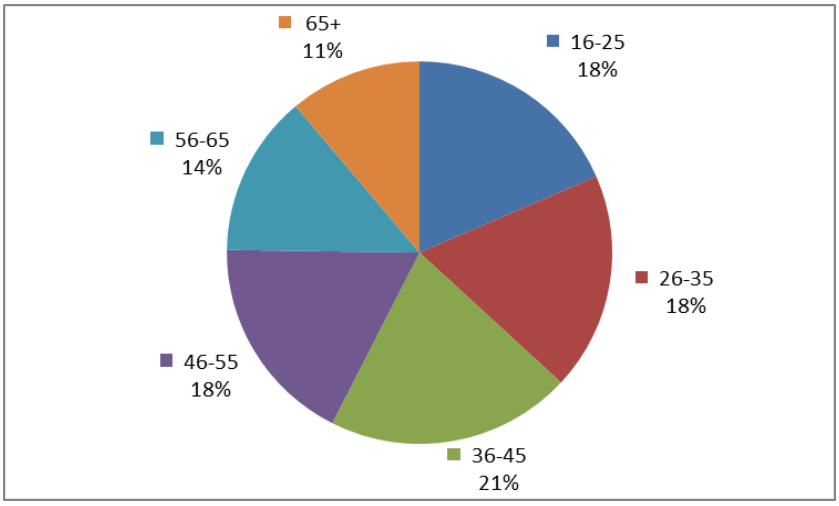


Figure 4.2 provides an outline of the age groups who completed the face-to-face group surveys. All respondents answered this question. The graph shows that responses were predominately from those aged less than 46 years. A breakdown of the difference in age group profile of all age groups is provided in figure 4.2.

Figure 4.2 Age of face-to-face group respondents

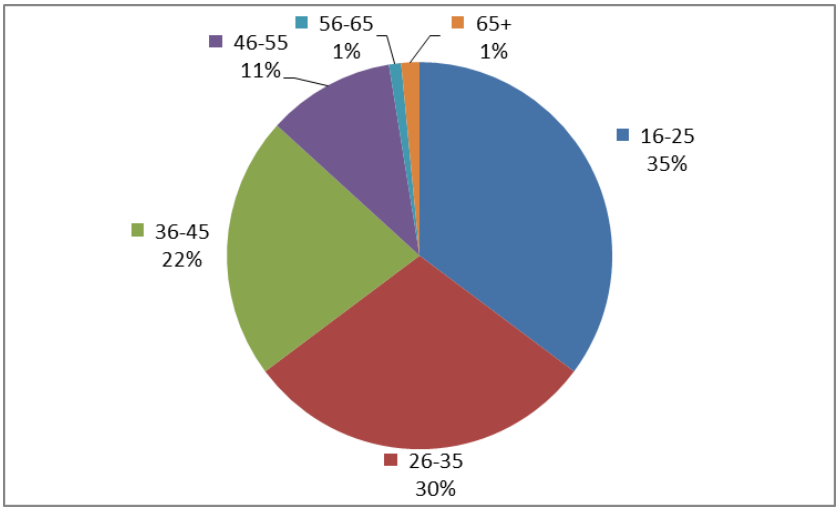
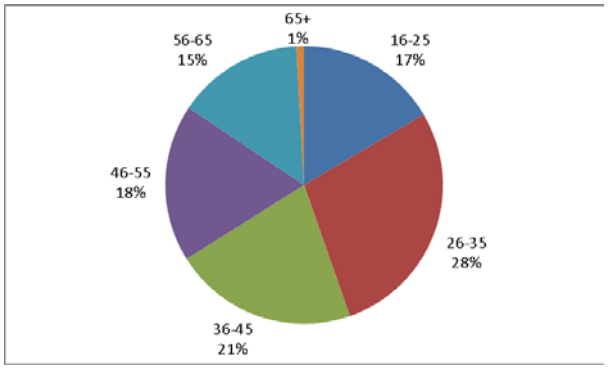
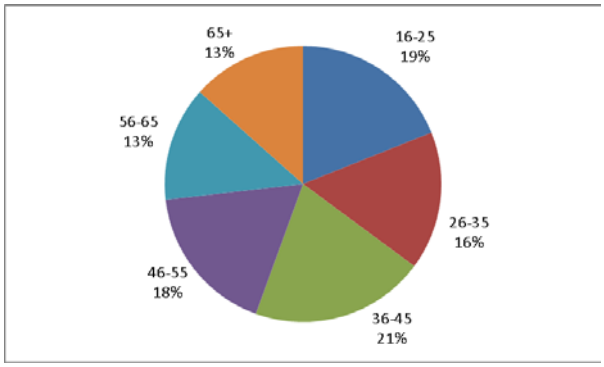


Figure 4.3 Comparison of the age profile of the telephone and internet survey respondents





The internet survey response attracted a younger age profile, as expected. The telephone survey age profile was pre-determined to compare with the age characteristics of the general population.

The telephone survey shows the most even distribution of ages. The telephone interviewers were required to collate survey responses representative of all age groups. The internet surveys increase the proportion of people aged 36–45 within the general population sample.

There was a higher proportion of younger people in the face-to-face group.

The number of people in each age group for each of the survey methods is shown in table 4.2.

Table 4.2 Number of people in each age group

Survey	16–25	26–35	36–45	46–55	56–65	65+	Total
Telephone	189 (18.9%)	162 (16.2%)	204 20.4%)	176 (12.6%)	134 (13.4%)	134 (13.4%)	**999**
Internet	37 (16.5%)	63 (28.1%)	48 (21.4%)	41 (18.3%)	33 (14.7%)	2 (0.8%)	**224**
Telephone and internet	226 (18.4%)	225 (18.4%)	252 (20.6%)	217 (17.7%)	167 (13.6)	136 (11.1%)	**1223**
Face-to-face group	69 (35.2%)	58 (29.5%)	43 (21.9%)	21 (10.7)	2 (1.0%)	3 (1.5%)	**196**

4.2.2 Gender

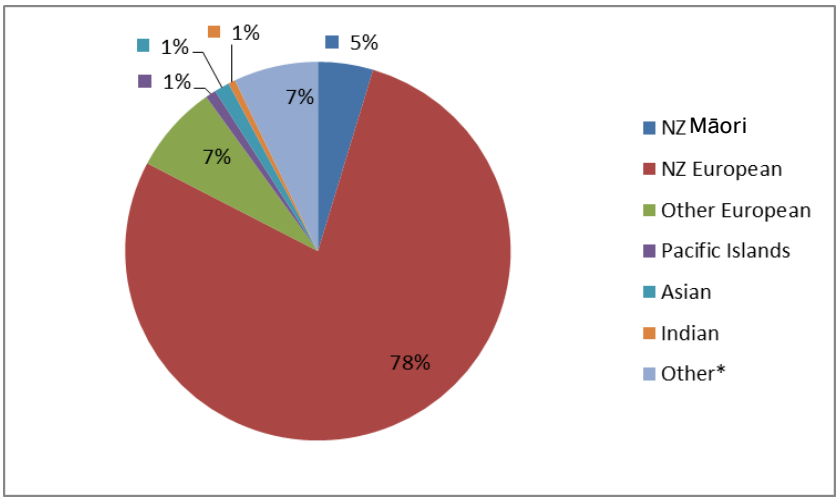
The 1224 valid responses (96% response rate) from the telephone and internet surveys show an even split between males (47%) and females (53%). Similar proportions are evident in both the internet and telephone survey respondents. The internet survey responses show that 50 people chose to skip this question.

A total of 194 valid responses (99%) from the face-to-face group indicates the majority of the respondents were male (95%). Only 10 female interviewees were involved in this study (5%). This reflects most of the prisoners being from a men's prison. There were a few female prisoners and a few female benzodiazepine users recruited through medical centres.

4.2.3 Ethnicity

Details of the ethnic origin of study respondents were collated in the telephone and internet surveys. In total, 1016 valid responses were received (80% response rate). Overall, New Zealand Europeans dominate the sample set (78%), followed by Other European at 7%. New Zealand Māori account for 5% while people of Pacific Island, Asian or Indian origin each make up 1% of the sample. The results are shown in figure 4.4.

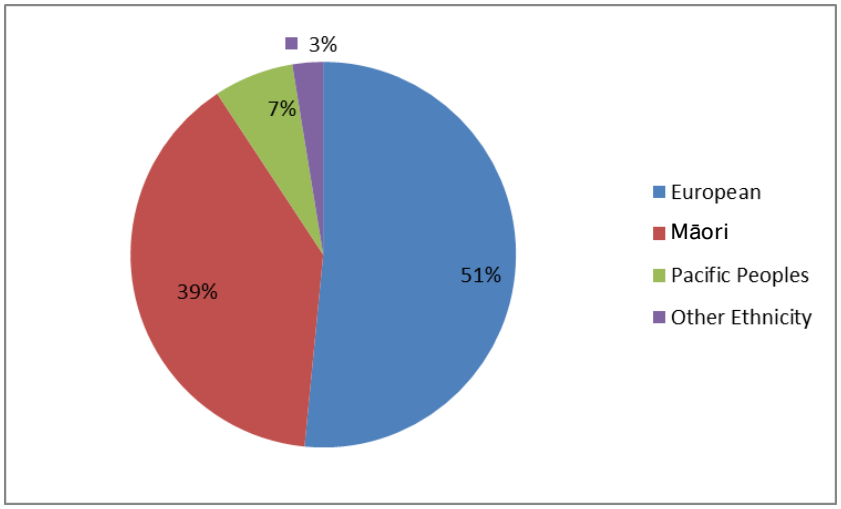
Figure 4.4 Ethnicity of the telephone and internet survey respondents



* Note: 'Other' includes respondents from other ethnic backgrounds and people with mixed ethnicities

The face-to-face group survey also gathered ethnicity data using different groups. A total of 194 responses (99% response rate) was received. Europeans dominated the sample at 51%, followed by Māori at 39%. The remaining 10% were identified as either Pacific Islanders or another ethnic group. This reflects the typical prison population. The results are shown in figure 4.5.

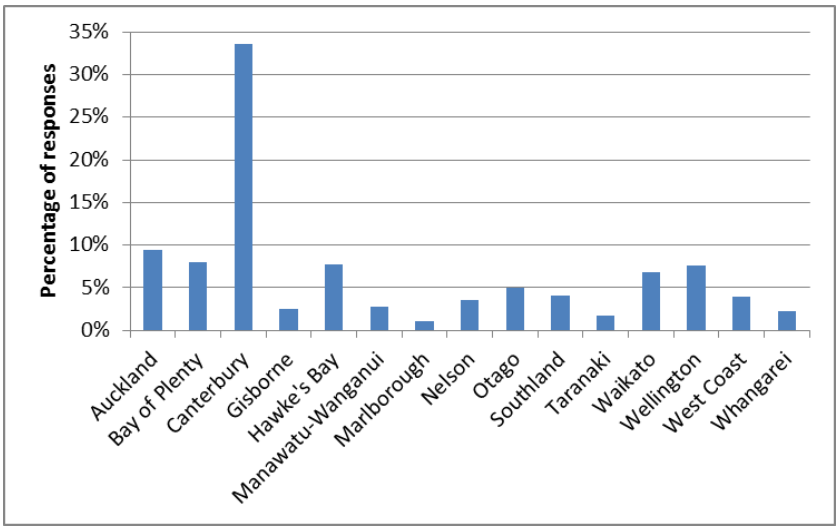
Figure 4.5 Ethnicity of face-to-face group respondents



4.2.4 Region

A total of 1172 valid responses from the telephone and internet surveys (92% response rate) provided details of the residential location of respondents. The largest proportion, 34% of all survey respondents, was based in Canterbury. The population sample was random as to age groups but not location. Figure 4.6 shows the representation from other regions, chief among these were Auckland, Bay of Plenty, Hawke's Bay, Waikato and Wellington, which each accounted for between 7% and 9% of the sample set.

Figure 4.6 Region of telephone and internet survey respondents

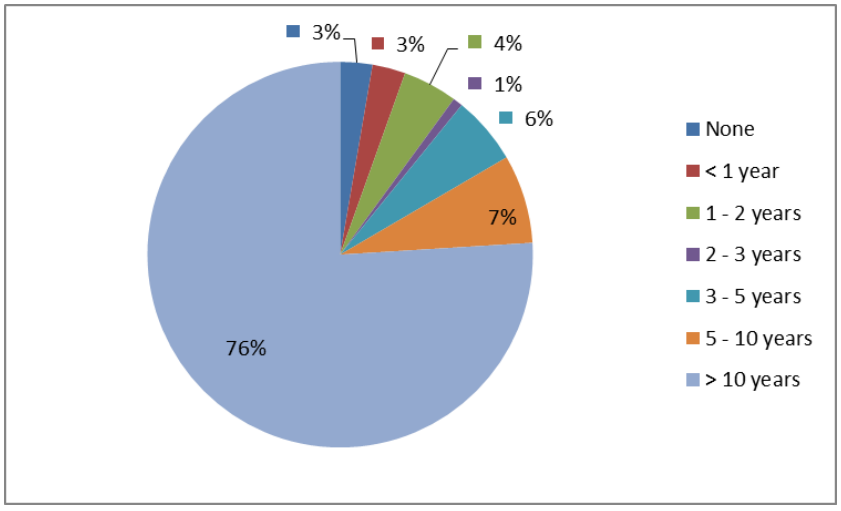


The face-to-face group survey, which mainly involved participants from Christchurch prison, asked if they were from Canterbury or another region. A total of 195 valid responses (99% response rate) was received, with 47% from Canterbury and 53% from other regions.

4.2.5 Driving experience

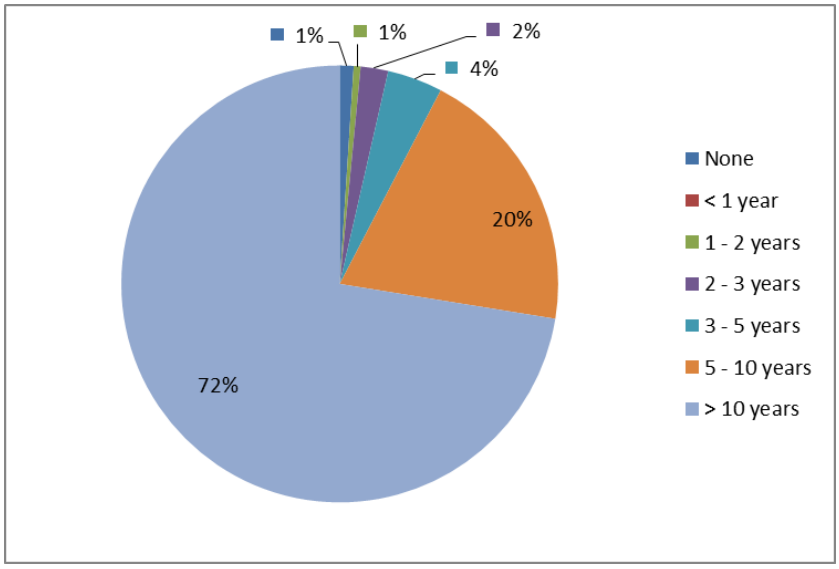
The majority (76%) of the 1274 telephone and internet survey respondents said they were experienced drivers with 10 or more years of driving experience, while another 7% had been driving for between five and 10 years. Figure 4.6 presents the results of the driving experience of these surveys.

Figure 4.7 Driving experience of telephone and internet survey respondents



Similarly, the majority (72%) of the face-to-face group respondents said they had more than 10 years of driving experience and 20% responded with between five and 10 years of driving experience. Figure 4.8 presents the results of the driving experience of these respondents.

Figure 4.8 Driving experience of face-to-face group respondents



It is noted from the age and driving experience results that most of the face-to-face group had been driving for several years. Further cross tabulations by age indicate how long each age group had been driving. Figures 4.9 and 4.10 illustrate the results by general population (telephone and internet surveys) and face-to-face group respectively.

Figure 4.9 Driving experience by age of telephone and internet survey respondents

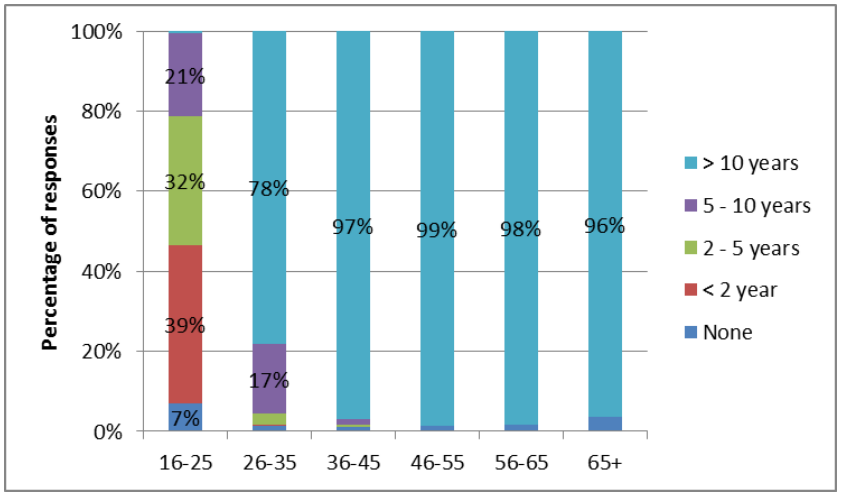
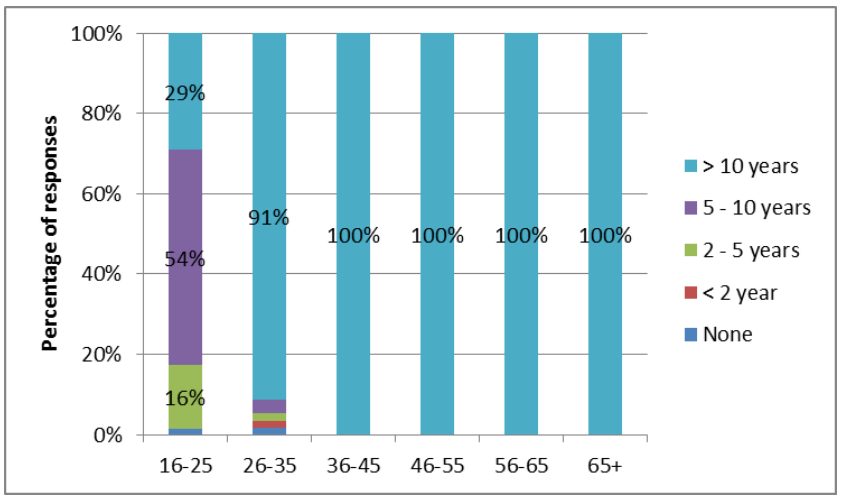


Figure 4.10 Driving experience by age of face-to-face group respondents



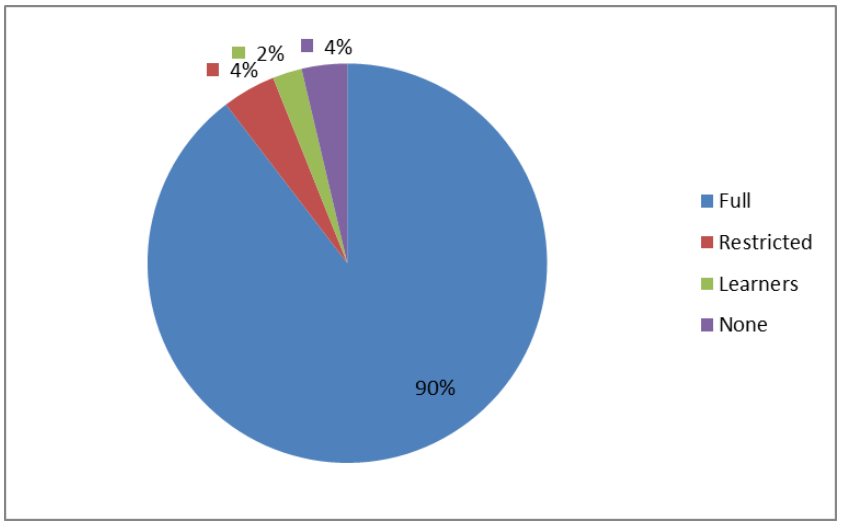
In both groups, the majority of drivers over the age of 26 had had more than 10 years of driving experience. Most of 16–25 year olds from the face-to-face group had driven for more than five years.

4.2.6 Licence type

Connected with driving experience, is the licence type held by respondents.

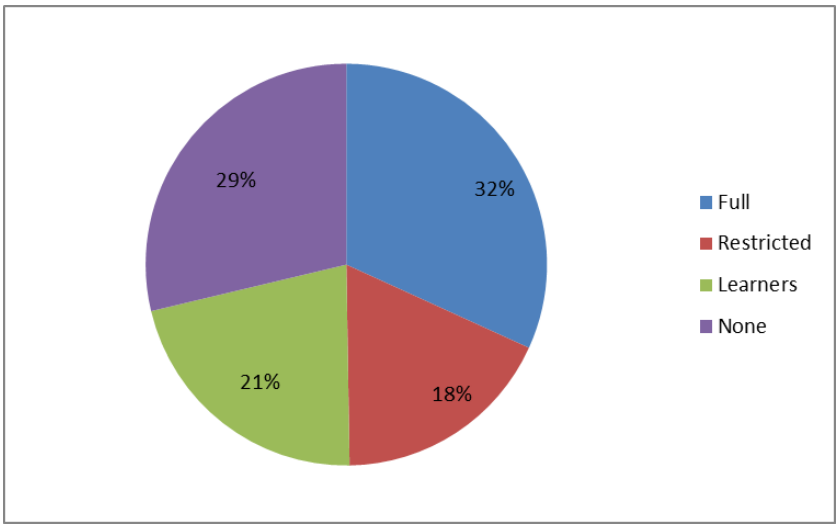
A total of 1222 valid telephone and internet responses (96% response rate) was received for this question, with 52 internet survey respondents choosing not to respond. Of all respondents, 90% reported having a full licence. Drivers with no licence accounted for 4% of responses and those holding a learner or restricted licence accounted for 6% of the total sample set. These results are presented in figure 4.11.

Figure 4.11 Licence type of telephone and internet survey respondents



In contrast, of the 195 responses in the face-to-face group survey, 32% held a full driver licence. Those holding no licence accounted for 29% of responses and 39% held either a learner or restricted licence. These results are presented in figure 4.12.

Figure 4.12 Licence type of face-to-face group respondents



It is noted from age and licence type results that most of the face-to-face group had been driving for several years. Further cross tabulations of licence type by age are presented in figures 4.13 and 4.14 by the telephone and internet survey respondents and the face-to-face group respectively.

Figure 4.13 Licence type by age of telephone and internet survey respondents

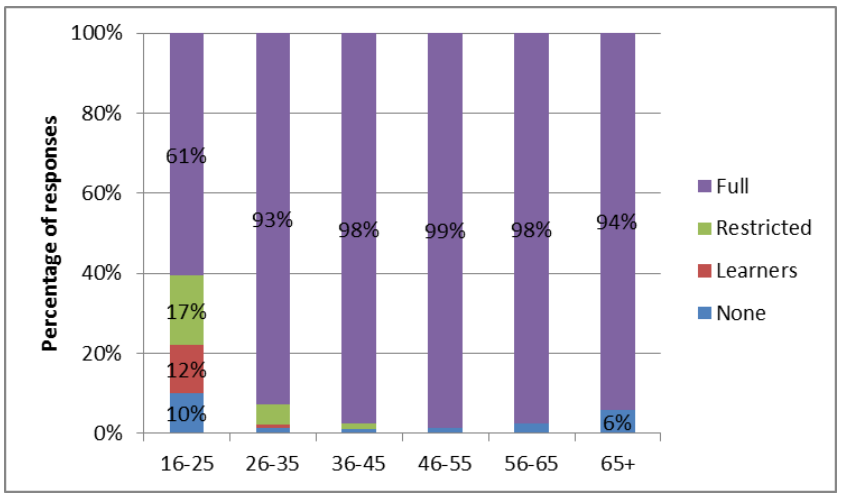
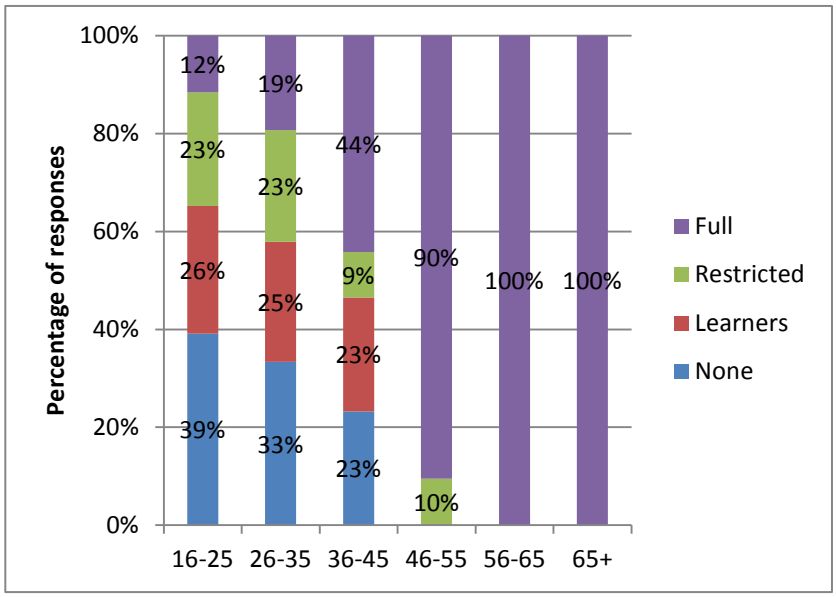


Figure 4.14 Licence type by age of face-to-face group respondents

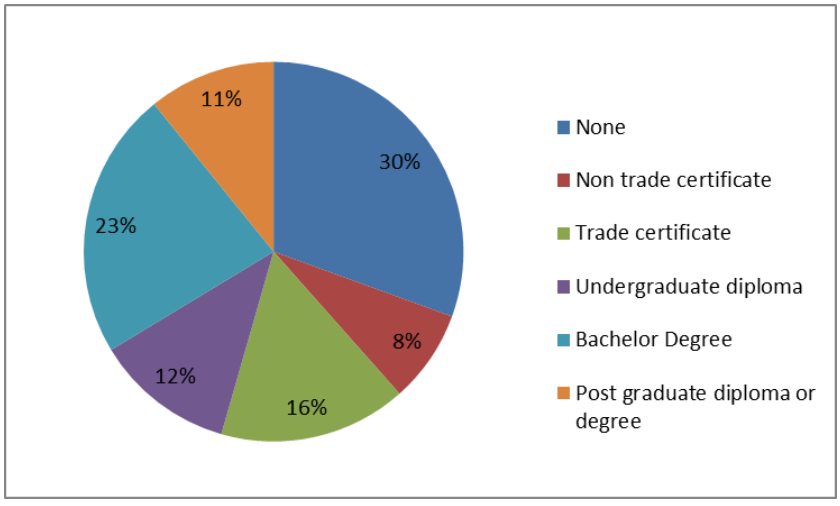


The telephone and internet survey results show driving experience and licence type were very similar (those driving for a long time held a higher level of licence). In the face-to-face group, 81% in the 26–35 age group did not hold a full licence and a further 55% in the 36–45 age group also did not hold a full licence. The majority of these drivers had more than 10 years driving experience.

4.2.7 Qualifications

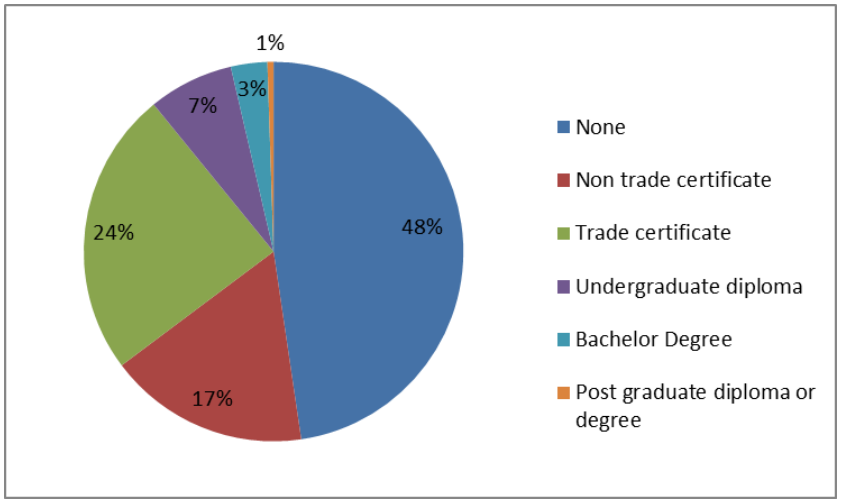
A total of 1126 telephone and internet respondents reported their highest qualification (88% response rate). Of the responses received, the largest proportion (30%) had no formal qualification beyond high school, although this group did include a very small number of respondents who were presently engaged in training certificates or bachelor degrees. Another 23% and 16% had obtained a bachelor degree and trade certificate respectively. These results are presented in figure 4.15.

Figure 4.15 Highest qualification of telephone and internet survey respondents



Of the 193 face-to-face group survey responses, 48% had no qualification beyond high school. Only 3% and 24% had obtained a bachelor degree and trade certificate respectively. These results are presented in figure 4.16.

Figure 4.16 Highest qualification of face-to-face group respondents



Figures 4.17 and 4.18 show the highest qualification achieved for each age group.

Figure 4.17 Highest qualification by age of telephone and internet survey respondents

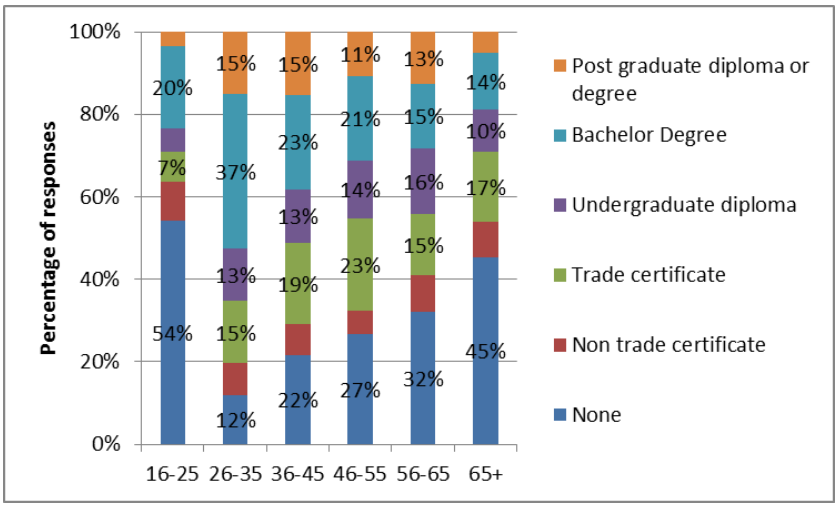
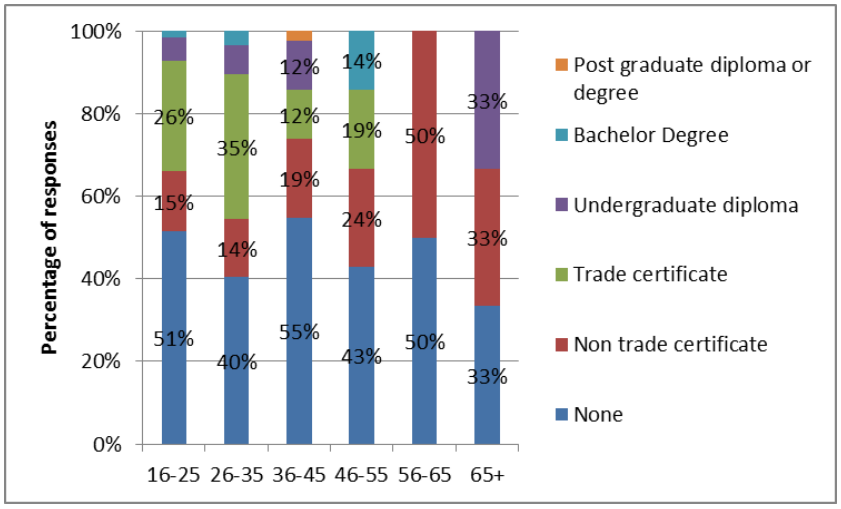


Figure 4.18 Highest qualification by age of face-to-face group respondents



The telephone and internet surveys show that the older the person, the less likely they were to hold any qualification. This reduced in the younger age groups. The 26–35 year olds held the largest proportion of degrees, and this decreased in the older age groups. Age group 16–25 did not follow these trends.

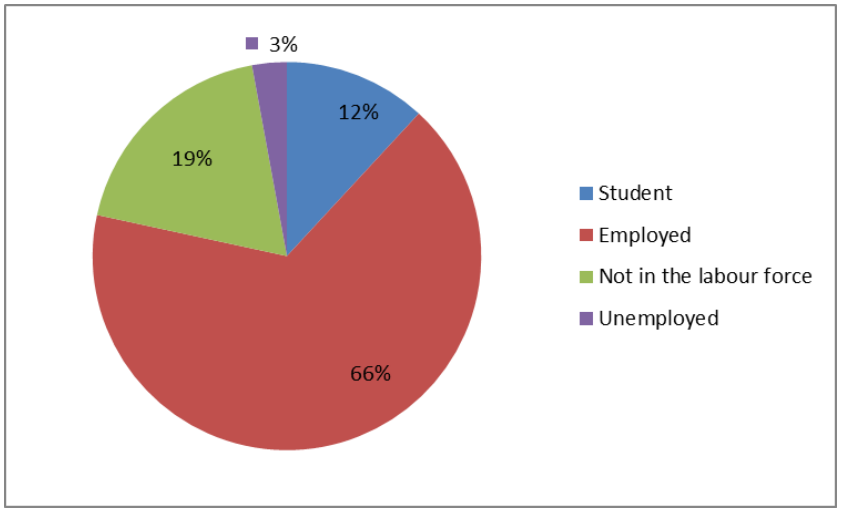
The face-to-face group respondents were more likely to hold no qualifications, no matter what their age. A larger proportion held a non-trade certificate than in the telephone and internet survey group.

4.2.8 Occupation

The majority (66%) of the 1213 valid telephone and internet survey responses received were from respondents who were in paid employment at the time of the survey. This proportion was significantly higher for the internet survey, which had almost 90% employed respondents.

Students made up 12% of all valid responses, while unemployed respondents and those not in the labour force accounted for the remaining 3% and 19% respectively. The results for the general population are shown in figure 4.19.

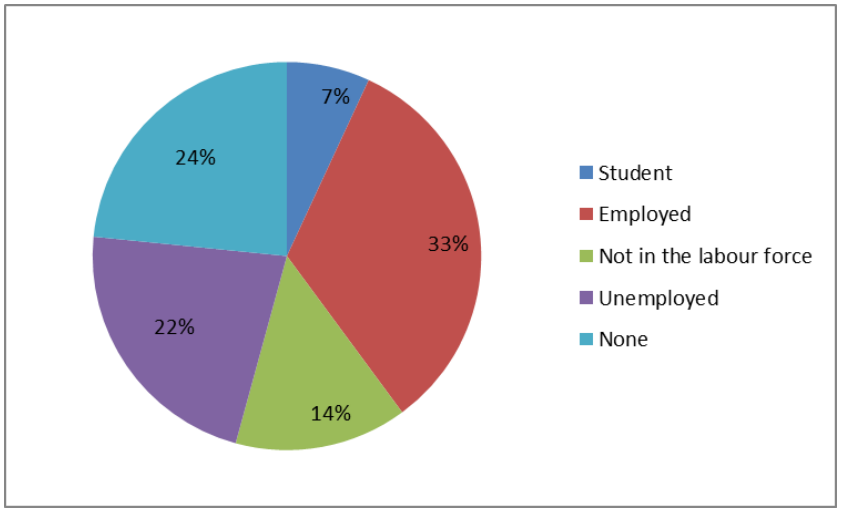
Figure 4.19 Occupation of telephone and internet survey respondents



A smaller proportion (33%) of the 188 valid face-to-face group survey respondents were employed. Students made up 7% of responses and 14% were not in the labour force. Those unemployed and without employment were 22% and 24% respectively. The results are shown in figure 4.20.

The 10 respondents who undertook the survey from a private home reported four employed, four not in the labour force and two without employment.

Figure 4.20 Occupation of face-to-face group respondents



A further cross tabulation of employment by age is shown in figures 4.21 and 4.22 for the general population and face-to-face survey respondents respectively.

Figure 4.21 Employment by age of telephone and internet survey respondents

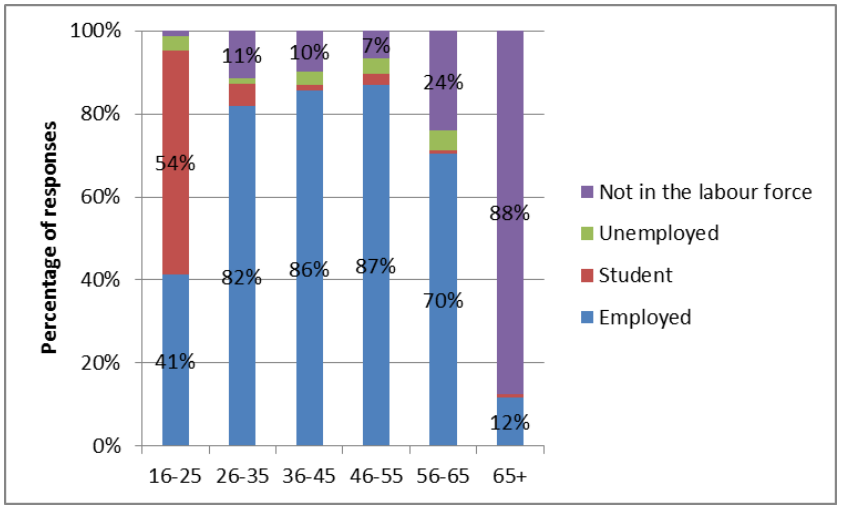
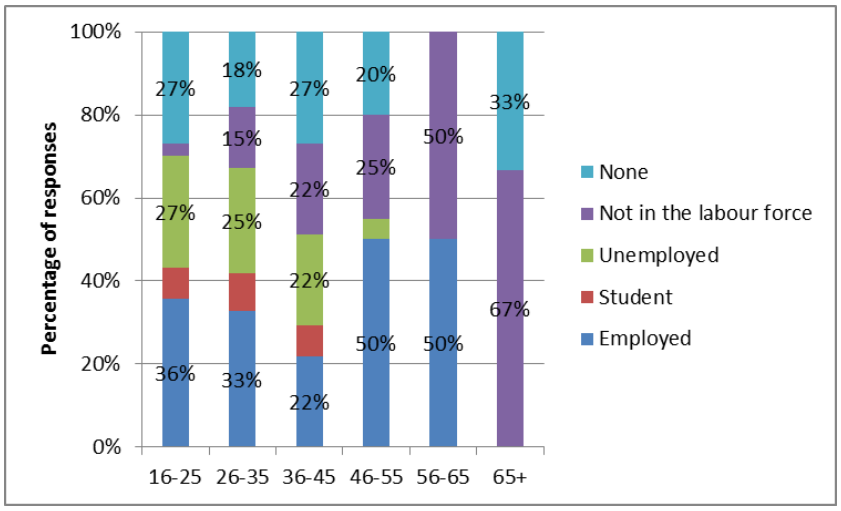


Figure 4.22 Employment by age of face-to-face group respondents



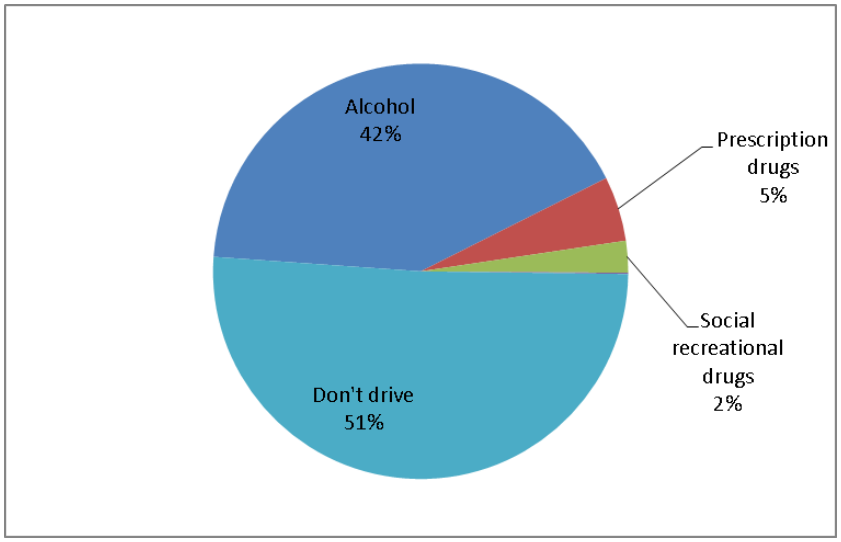
4.3 Prevalence of drug-driving

4.3.1 Driving after taking alcohol or drugs

Respondents were asked whether they might have driven within three hours of taking alcohol or prescription/social drugs during the last 12 months. Of the 1000 valid responses to the telephone survey, 436 said that they had driven after consuming alcohol, while 53 telephone and 21 internet respondents reported using prescription drugs and social/recreational drugs. Only 27 respondents reported using more than one of these substances in combination. The remaining 535 respondents did not use any of the above substances within three hours of driving, or did not drive, while one person declined to comment.

Figure 4.23 outlines the alcohol consumption and drugs used by the general population.

Figure 4.23 Drug and alcohol use while driving of telephone survey respondents)

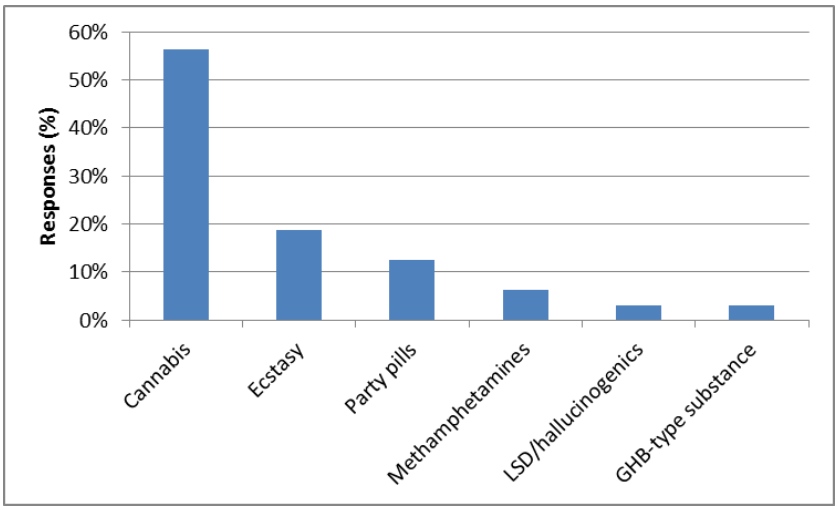


The 465 respondents who answered the previous question in the affirmative were asked what they had taken. Alcohol was reported by 431 respondents (as opposed to 436 previously). In a subsequent question, 39 respondents admitted to being over the alcohol limit. This response was based on a

subjective self-assessment as to whether they thought they were over the legal limit. The question did not specify the adult drinking age and the response would be applicable to the legal limit applied to the individual.

Of this sample set, 18 people said they used cannabis, while a number of respondents also admitted using ecstasy (6), party pills (4), methamphetamines (2), LSD (1) and gamma-hydroxybutyric (GHB) type substances (1).

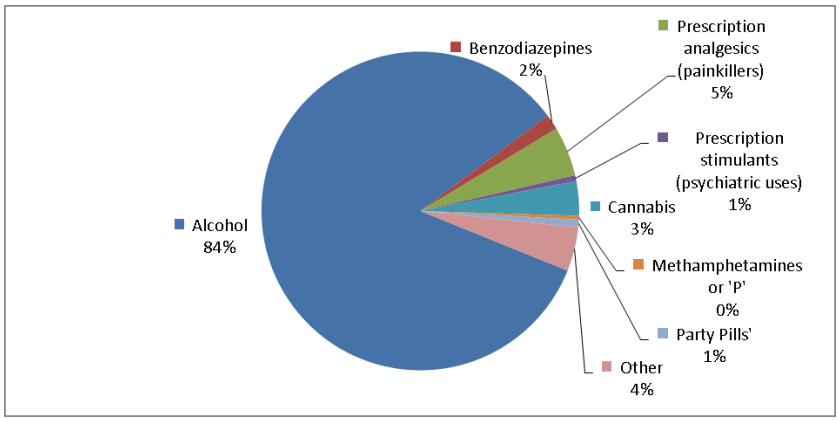
Figure 4.24 Social and recreational drug used before driving (among those respondents who reported having driven within three hours of taking alcohol or prescription/social drugs during the last 12 months) (telephone and internet surveys)



Due to a survey software issue, internet responses could not be collected on the detailed substance use of respondents while driving. However, 55% of internet survey respondents (127 out of a total of 231 who answered this question) admitted to driving within three hours of consuming alcohol, prescription or recreational drugs.

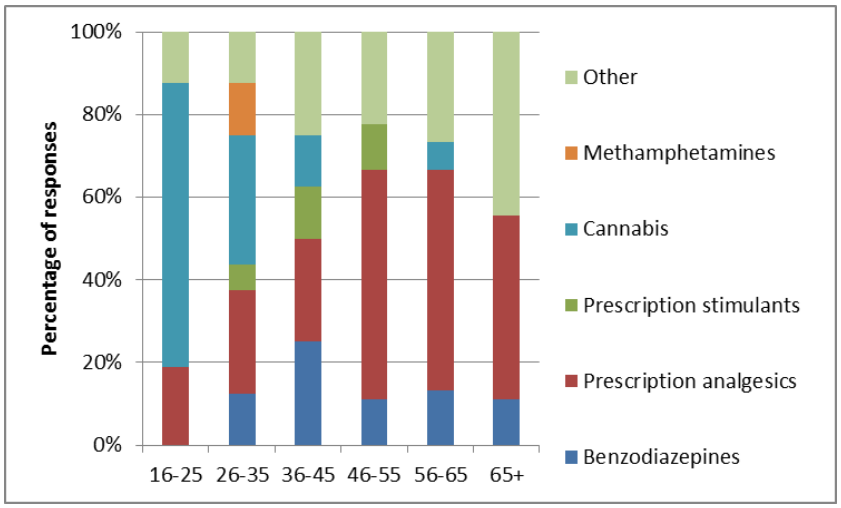
The face-to-face group surveys focused on four user groups: alcohol and other drugs, benzodiazepines, cannabis, and methamphetamines. All 196 respondents identified which group they belonged to. This is presented in figure 4.25. The largest group, 81 respondents, used a mixture of drugs. This was followed by alcohol and cannabis users (45 respondents) and methamphetamines (25 respondents).

Figure 4.25 Drug and alcohol use of face-to-face group respondents



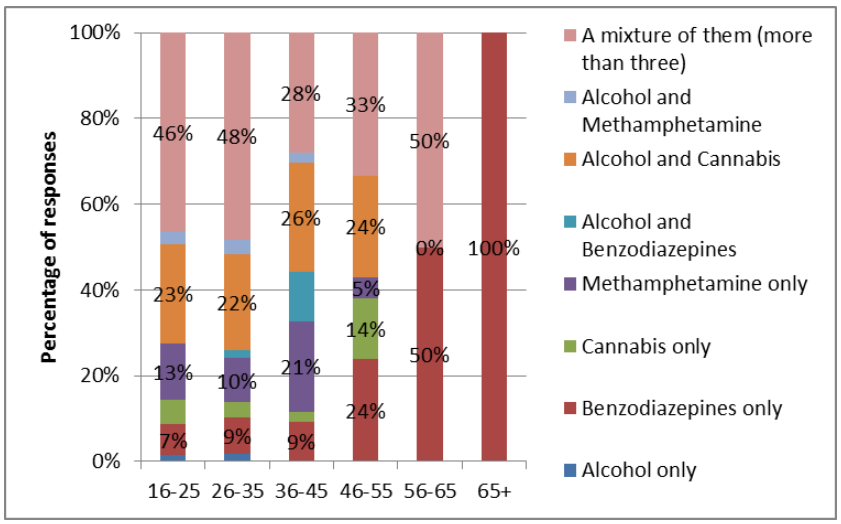
A further cross tabulation of alcohol and drug use by age is shown in figures 4.26 and 4.27 for the general population and face-to-face group respondents respectively.

Figure 4.26 Reported types of drugs used prior to driving by age group (of those respondents who reported having driven within three hours of taking alcohol or prescription/social drugs during the last 12 months) (telephone survey only)



As shown in figure 4.27, prescription drugs were used more predominantly for the over 46 age group in the general population sample set. Cannabis was the most popular drug choice for the under 25 age group.

Figure 4.27 Alcohol and drug use prior to driving by age for face-to-face group respondents

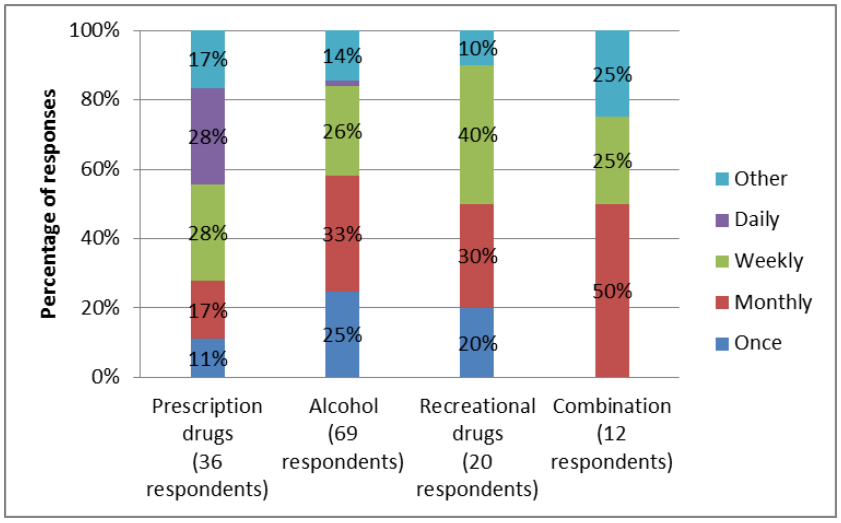


The results of the age group analysis for the face-to-face group respondents indicated that a large proportion of respondents used a mixture of drugs when driving.

4.3.2 Frequency of use

Respondents were asked how often they might have driven during the last 12-month period within three hours of taking alcohol, drugs or a combination of the two. The results of the telephone survey are shown in figure 4.28. The majority of drivers using recreational drugs were doing so either monthly or weekly.

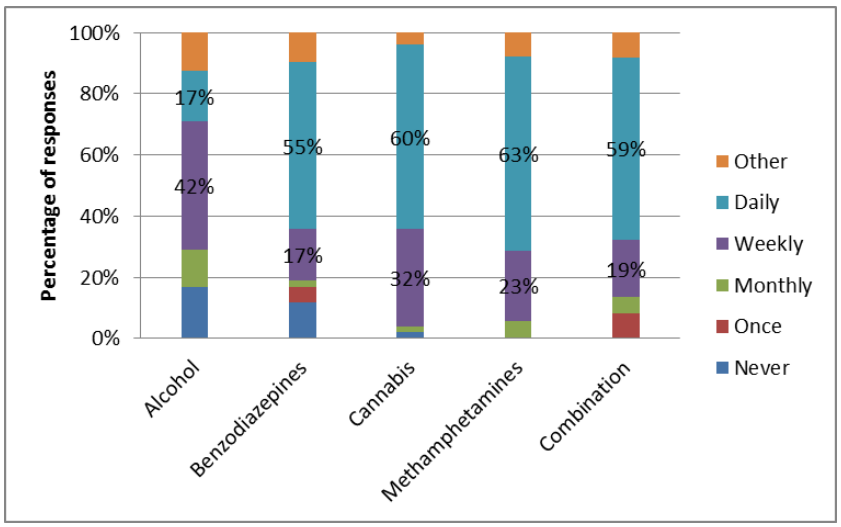
Figure 4.28 Proportion of drug and alcohol use while driving (among those participants who reported having driven within three hours of taking alcohol or prescription/social drugs during the last 12 months) (telephone survey)



In addition, 58 of 94 respondents to a subsequent question indicated they were likely to have driven with a passenger at the time.

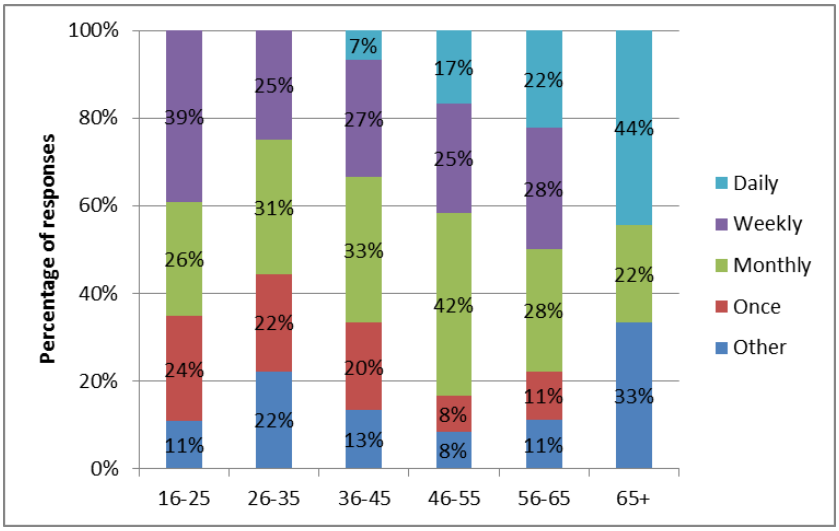
Figure 4.29 provides the results of the frequency of use for the face-to-face group respondents.

Figure 4.29 Frequency of use of face-to-face group respondents



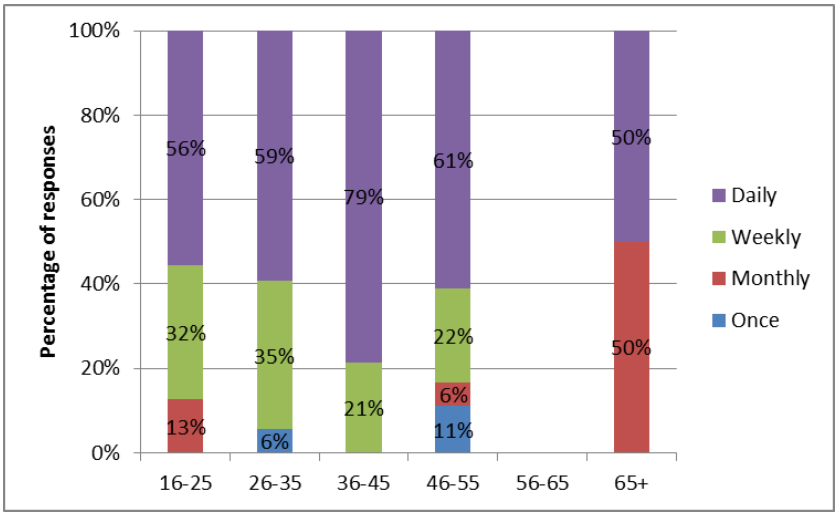
A further cross tabulation of frequency of use by age is shown in figures 4.30 and 4.31 for the general population and face-to-face group respondents respectively.

Figure 4.30 Frequency of alcohol and drug use prior to driving by age for the general population (among those participants who reported having driven within three hours of taking alcohol or prescription/social drugs during the last 12 months) (telephone survey only)



The key difference in the survey results was that the majority of the face-to-face group used drugs at least daily or weekly. A more recreational pattern of use was observed for the general population.

Figure 4.31 Frequency of alcohol and drug use prior to driving by age for face-to-face group respondents



4.3.3 Case group: telephone and internet survey respondents who drove under the influence of alcohol or drugs

Further examination of the 464 respondents who reported driving within three hours of taking alcohol or prescription/social drugs during the last 12 months revealed a slight over-representation of males (57%). Nearly all of these drivers (96%) had a full licence. In addition, these drivers still rated themselves as being highly safety conscious, law abiding and good drivers. It is interesting to note that 283 (61%) of these drivers had also been passengers with a drink/drug driver in the preceding 12-month period.

4.3.4 Case group: telephone and internet survey respondents who drove under the influence of drugs excluding alcohol

The sample set for this case group consisted of 21 valid responses. All drivers reported driving within three hours of consuming drugs; 17 had also consumed alcohol while two had taken prescription drugs.

These respondents were predominantly male (71%) and most had more than three years driving experience (76%). The proportion of respondents with a bachelor degree or higher was similar to that in the overall sample set, although the proportion of respondents with a non-trade certificate was higher. However, only 57% were employed compared with 68% for the total survey sample set.

The most common substances taken by these drivers were cannabis (86%), ecstasy (29%) and party pills (19%). Of all respondents in this group, 67% reported using a combination of these substances and 80% stated they were likely to have driven with a passenger at the time.

While the responses for drivers' perceptions of being highly safety conscious (81%), law abiding (71%) and good drivers (91%) are lower than those for the overall sample, the figures do indicate that the majority of drivers who drove after taking social drugs still considered themselves to be 'in control'.

It was noted that 91% of respondents from this case group had been passengers with a drunk/drug driver in the preceding 12-month period. Those who reported being in this situation believed that the most common substances consumed by their drivers were alcohol and cannabis (29% each) and ecstasy (37%). Fifty-three percent of drink drivers were considered to be over the limit.

Of the respondents who were passengers in this situation, 83% reported feeling either safe or very safe at the time. This is likely to have been a key contributing factor in their decision to drive under the influence of social drugs themselves.

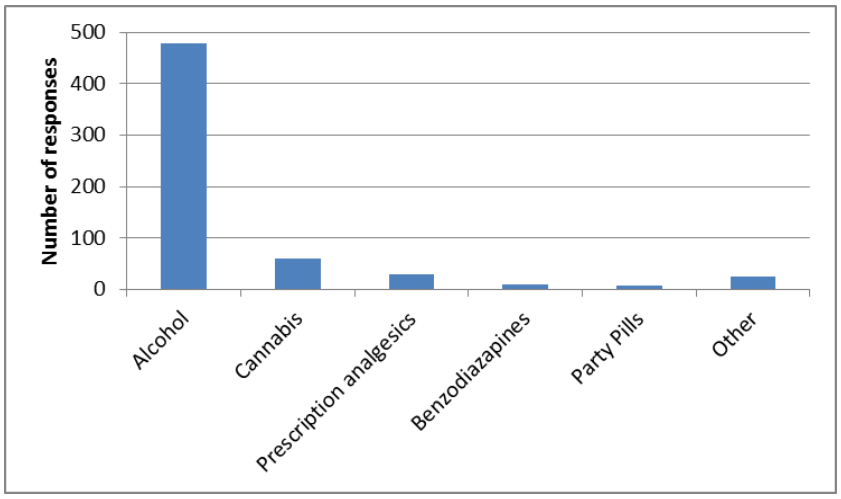
4.3.5 Passengers with a driver who was under the influence of drugs or alcohol

Respondents were asked whether they had been a passenger in a vehicle where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months. Out of the 1274 valid telephone and internet survey responses received, 478 said that they had, while 716 said they had not (the remaining 80 respondents were unsure or did not answer the question).

A larger proportion of the face-to-face group said they were passengers where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months. Of the 196 responses, 179 said they had been a passenger while three said they had not (with 14 either unsure or did not answer the question).

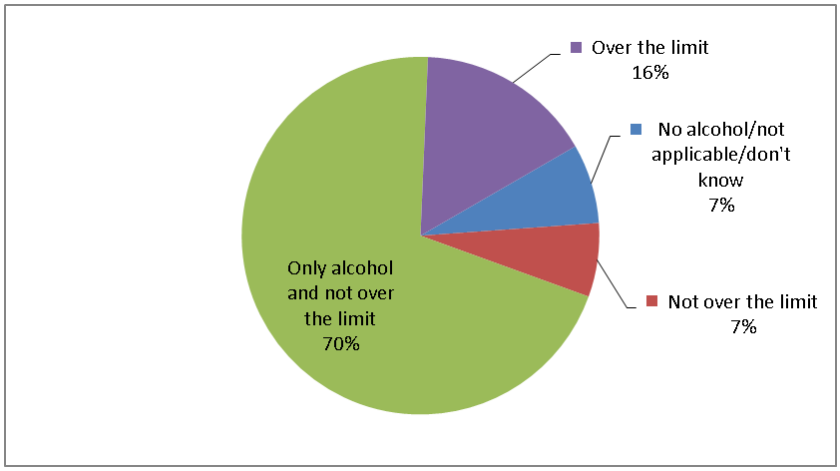
Respondents were then asked what they thought the driver had taken prior to driving. The results of the general population are shown in figure 4.32. The greatest response was alcohol with 478 responses followed by cannabis with 59 responses. All other substances had fewer than 30 responses.

Figure 4.32 Substance consumed by driver with a passenger (among those respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (telephone and internet surveys)



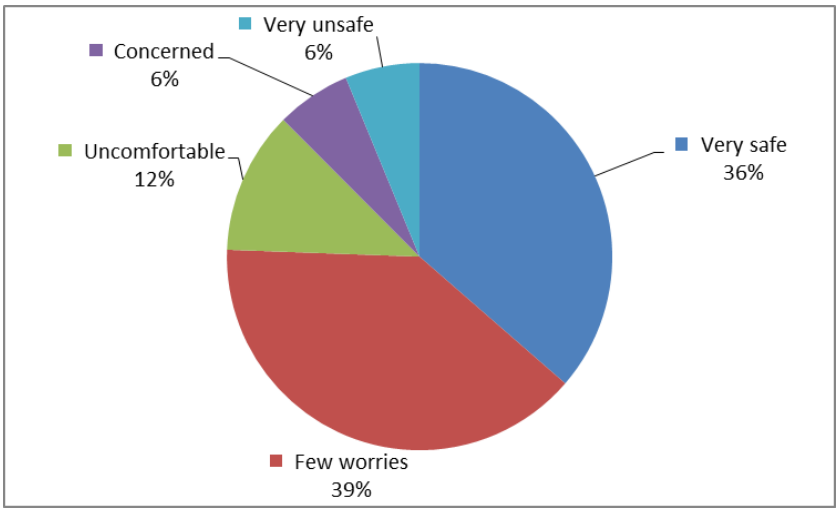
Following this question, respondents from the telephone survey were asked if they thought the driver was over the legal alcohol limit. Of the 375 respondents, 16% believed the driver to be over the limit, with 77% believing the driver was under the limit. Results are shown in figure 4.33.

Figure 4.33 'Was the driver over the alcohol limit?' (respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (telephone survey)



The substances consumed by the driver where members of the face-to face-group were present as a passenger are shown in figure 4.34. A similar number of respondents noted cannabis (146 responses) and alcohol (136 responses) had been consumed, followed by methamphetamines (96 responses).

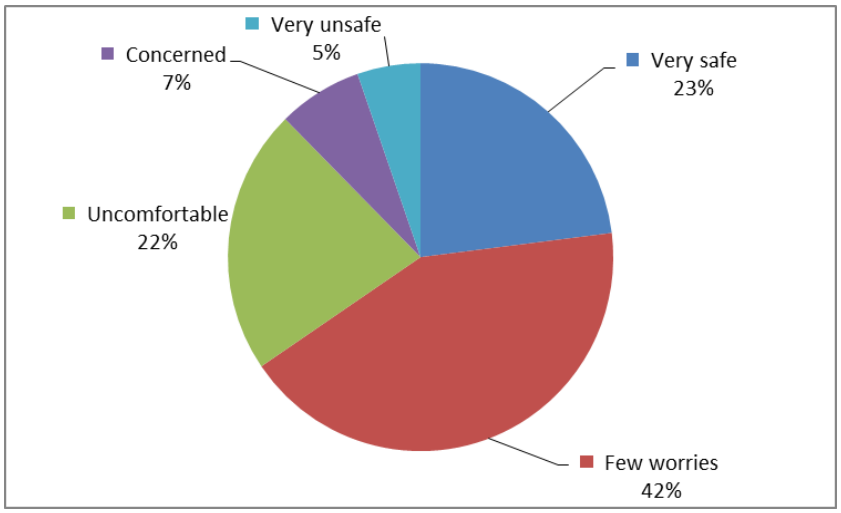
Figure 4.34 Substance consumed by driver with a passenger (from those respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (face-to-face group)



When asked how safe they felt being a passenger in that situation, 12% of the 113 telephone survey respondents to this question indicated that they felt very unsafe or were concerned, while another 64% said they felt uncomfortable or had a few worries. Results are shown in figure 4.35.

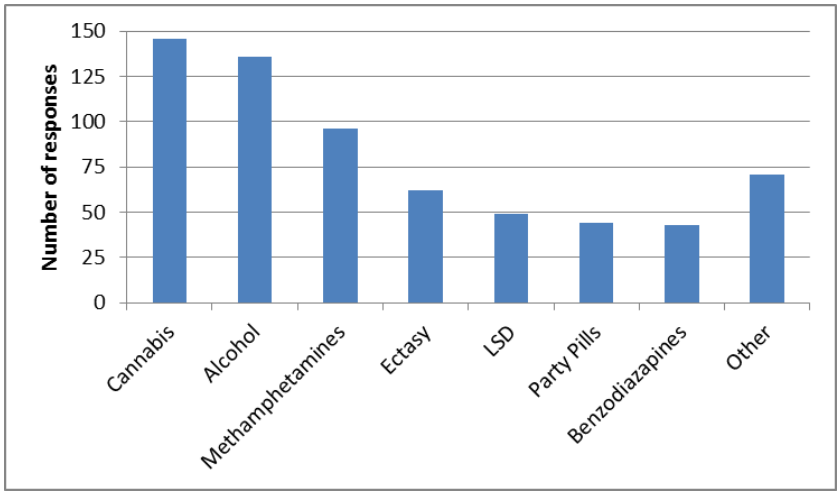
Only 20% of the 138 internet survey respondents said they raised their concerns with the driver.

Figure 4.35 How safe passengers felt (respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (telephone survey)



Similarly, 12% of the face-to-face group felt very unsafe or were concerned, while a smaller proportion of 51% said they felt uncomfortable or had a few worries. A larger number of 36% felt very safe. These results are shown in figure 4.36.

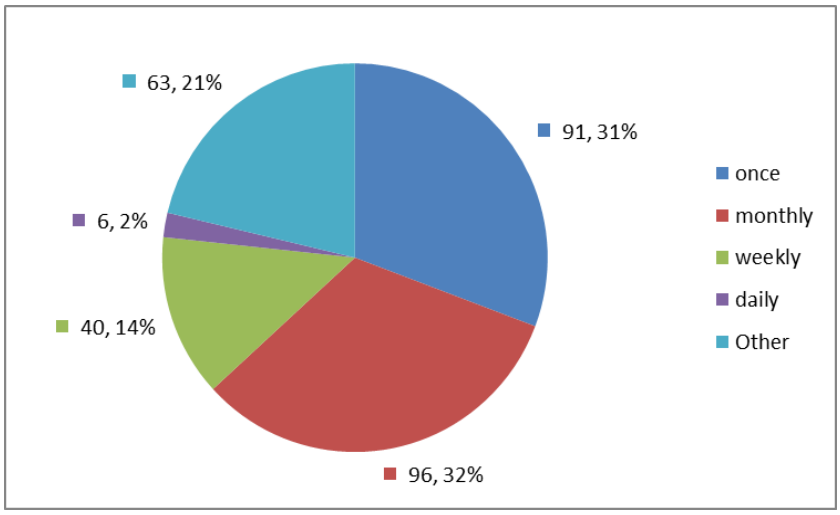
Figure 4.36 How safe passengers felt (respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (face-to-face group)



4.3.6 Frequency

Respondents were asked how often they had been a passenger in a car where the driver might have taken alcohol, drugs or a combination of the two. Only 262 responses were received for this question.

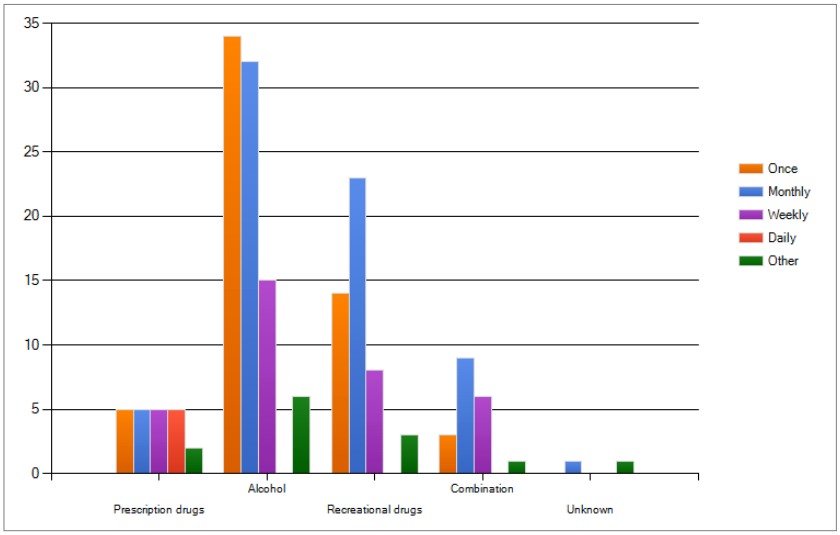
Figure 4.37 Reported frequency of being a passenger in a vehicle driven by somebody under the influence (among those respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (telephone and internet surveys)



While 31% of respondents said they had been in this situation once, it is concerning to note that 48% of respondents had experienced this monthly, weekly, or even daily.

A more refined analysis was possible for the telephone survey results, as shown in figure 4.38, based on 113 responses.

Figure 4.38 Reported frequency of being a passenger in a vehicle driven by somebody under the influence (among those respondents who reported having been a passenger where the driver drove within three hours of taking alcohol, recreation or prescription drugs during the last 12 months) (telephone survey)



4.3.7 Case group: telephone and internet survey respondents travelling with a driver under the influence of social drugs)

Of 63 valid responses received from people who had been a passenger in a vehicle where the driver had taken social drugs within three hours of driving, 59% came from male respondents.

The driving experience of respondents in this case group was typically less than that of the overall sample, with 29% having less than two years of experience behind the wheel. This is also reflected in the smaller percentage of respondents (65%) with a full licence. The proportion of respondents with no formal qualification was also quite high at 37%, as compared with 28% for the entire sample. Unemployed (8%) and student (34%) respondents constituted a large proportion of this case group.

Of the telephone survey respondents who drove with a drink driver, 38% said the driver was over the limit. As noted in the responses for driving under the influence of social drugs, passengers in a car where the driver had consumed social drugs were quite likely to drive after taking these drugs themselves. This is evidenced by the internet survey responses for this group, whereby 38% of respondents indicated that they might have driven within three hours of taking social drugs during the last 12 months. Another 58% reported alcohol use in a similar situation, with 28% of these admitting they were over the legal alcohol limit. Of all respondents, 41% used alcohol and drugs in combination.

4.4 Understanding the risks

4.4.1 Tendency to take risks

The survey included a series of questions designed to assess the risk-taking tendency of survey participants. These included the following questions:

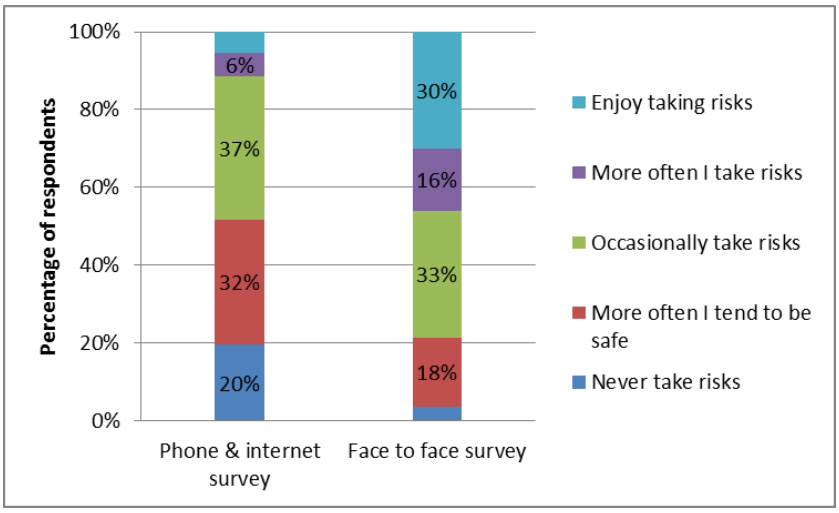
- Would you consider yourself to be a safety conscious person?
- Would you consider yourself to be a good driver?
- Would you consider yourself to be a law abiding person?

Valid responses were received from more than 99% of telephone and internet respondents, with the vast majority considering themselves to be safety conscious (98%), good drivers (95%) and law abiding (97%).

Survey participants were also asked to rate their overall affinity to risk taking. The responses received from the participants indicated a fairly even split between participants who were risk averse (never took risks, tended to be safe more often) and those who were risk prone (enjoyed taking risks, occasionally/ often took risks).

The majority of those in the face-to-face group considered themselves to be safety conscious (80%) and good drivers (91%) but only a minority considered themselves law abiding (43%). A comparison in risk aversion between the telephone and internet surveys and the face-to-face group is presented in figure 4.39. A larger proportion of face-to-face group respondents identified themselves as risk takers while a larger proportion of telephone and internet survey respondents identified themselves as risk adverse.

Figure 4.39 Reported risk aversion of respondents



Further analysis of the 143 survey participants (136 from the telephone survey and seven from the internet survey) who enjoyed taking risks or took risks often, revealed a higher representation of males (62%) in this group. While the majority of these respondents (83%) still had a full licence, 21% had been driving for two years or less, while another 14% had been driving for between three and five years, each of which is roughly double the proportion observed in the overall survey sample.

Although the ethnic composition of risk-prone respondents did not differ significantly from the overall sample set, this group did consist of double the proportion of students (25%).

4.4.2 Risk-taking behaviour by case groups

Figure 4.40 Reported risk-taking behaviour by drivers under the influence of social drugs (among those driving within three hours of taking social drugs) (telephone and internet surveys)

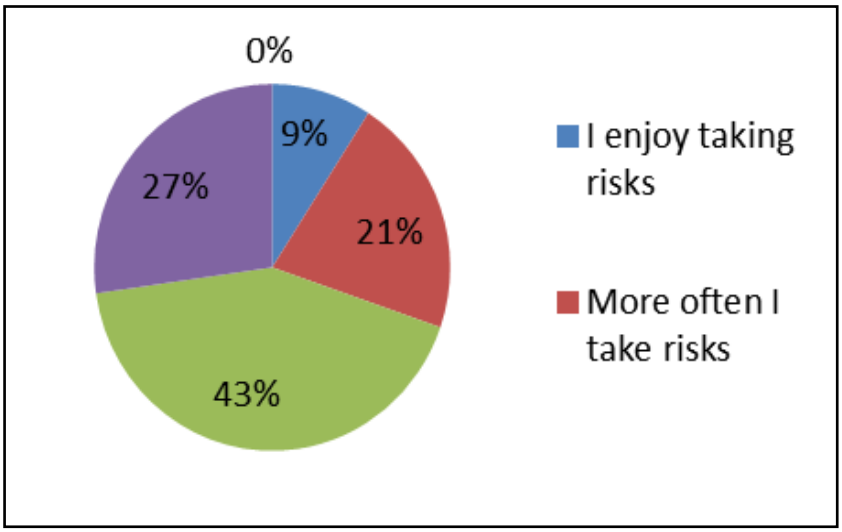
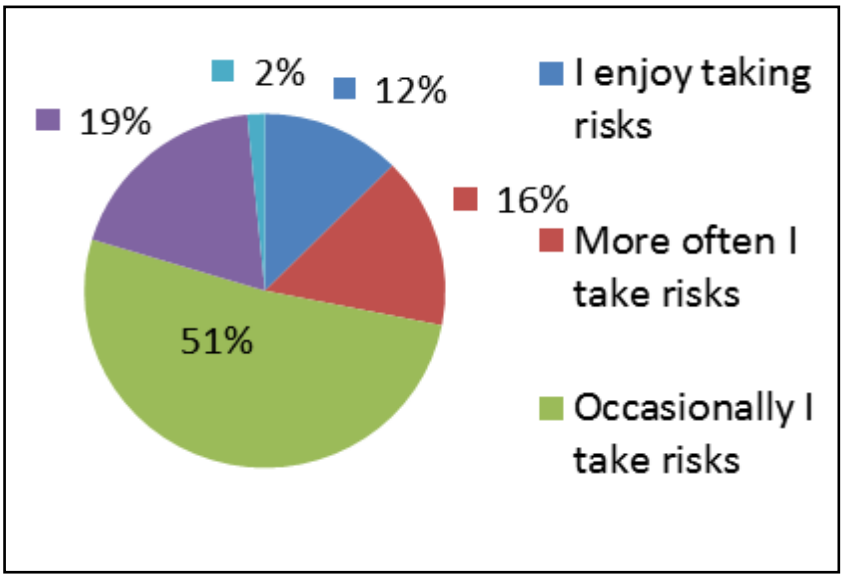


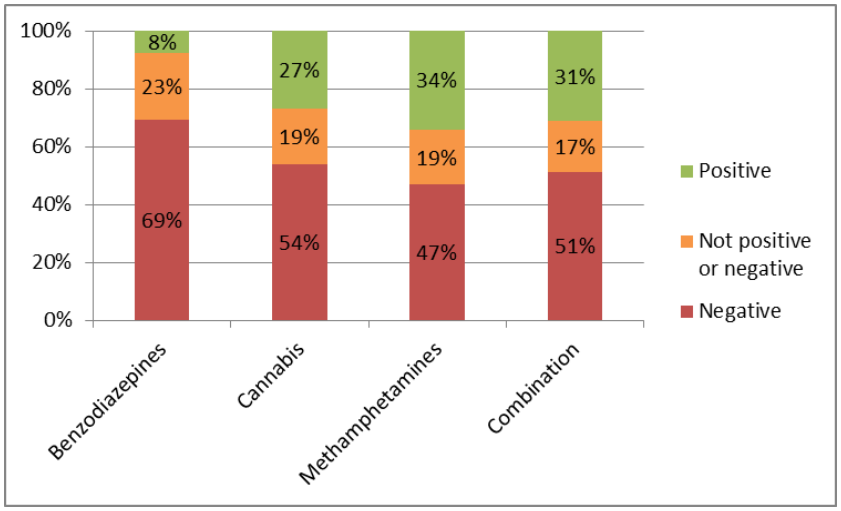
Figure 4.41 Risk-taking behaviour reported by passengers when they were in a vehicle where the driver was under the influence (among those respondents who reported having been a passenger where the driver drove within three hours of taking social or recreational drugs during the last 12 months (telephone and internet surveys)



4.4.3 Perceived risk of social drugs in relation to driving

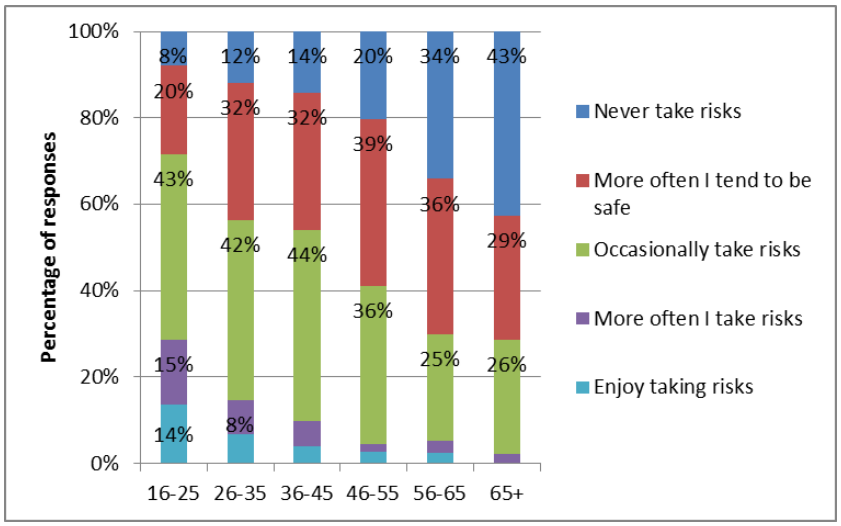
Survey respondents who reported driving within three hours of taking social drugs were asked to rate the driving risk posed by alcohol and various recreational and prescriptive drugs. A summary of the 21 responses is shown in figure 4.42. Despite the small sample size, the responses do suggest that a significant number of drug drivers felt that cannabis use before driving posed little or no risk. However, the respondents recognised the risk of drink-driving, even though most of them rated this as only moderately unsafe. Insufficient responses were received for the other drug types to be statistically valid.

Figure 4.42 Risk in relation to drivers on social drugs (among those respondents who reported driving within three hours of taking social or recreational drugs during the last 12 months (telephone and internet surveys)



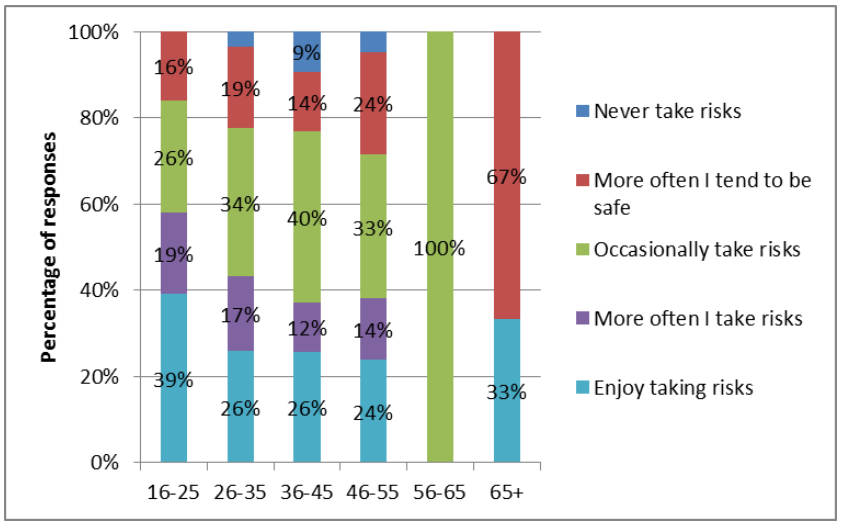
A further cross tabulation of likelihood of taking risks by age is shown in figures 4.43 and 4.44 for the general population and face-to-face group respondents respectively. The risk profile of the general population shows that the older the driver, the fewer risks they take. The majority indicated that they did occasionally take risks. The population under 25 years of age indicated an increased risk taking profile.

Figure 4.43 Risk behaviour by age for the general population (telephone and internet surveys)



The face-to-face group indicated they were more likely to take risks (see figure 4.44).

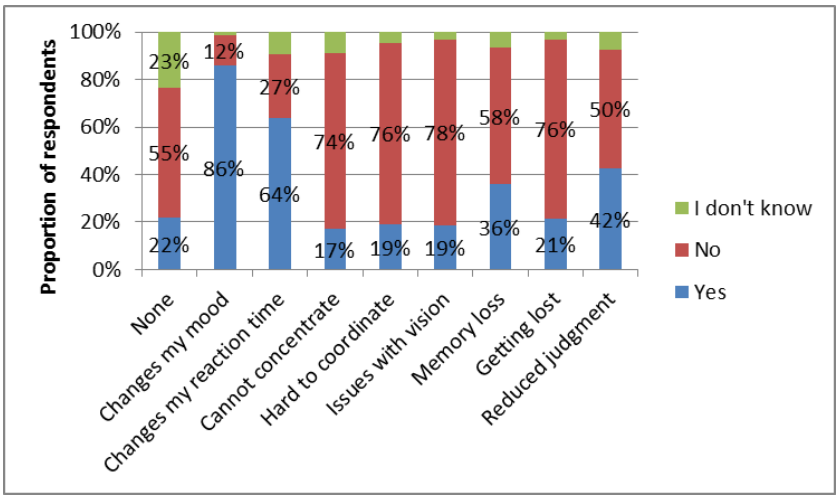
Figure 4.44 Risk behaviour by age for the face-to-face group



4.4.4 Effects and experiences of drugs and alcohol in relation to driving

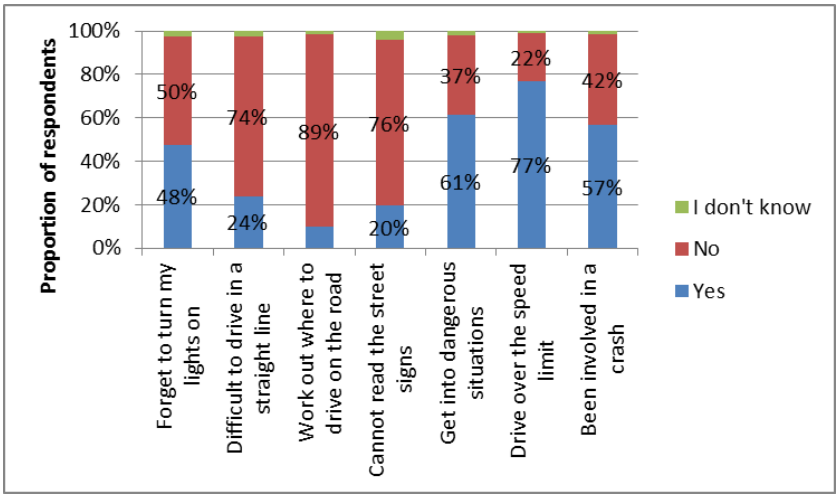
Members of the face-to-face group were asked what effects they experienced when taking medication, drugs and alcohol. These results are shown in figure 4.45. The greatest effect noted was a change in mood experienced by 86% of respondents. This was followed by 64% who said their reaction time changed and 42% who said they experienced reduced judgement. Only 22% reported experiencing none of the effects.

Figure 4.45 Did you experience these effects when taking medication, drugs and alcohol? (face-to-face group)



This question was followed by asking the face-to-face group what effects they experienced when driving. These results are shown in figure 4.46. The greatest number of respondents (77%) drove over the speed limit, followed by 61% who got into dangerous situations, 57% were involved in a crash and 48% forgot to turn on their lights.

Figure 4.46 Did you experience these driving-related effects when taking medication, drugs and alcohol? (face-to-face group)

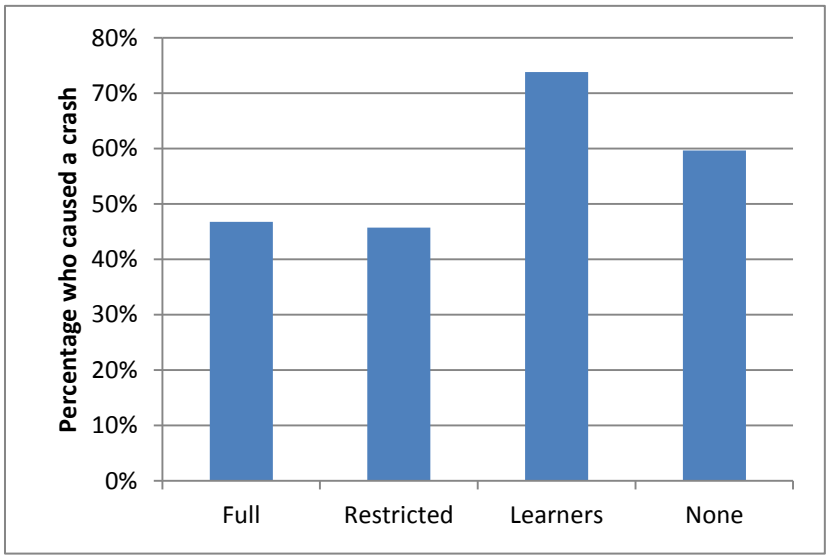


4.4.5 Risk reported by crashes compared to licence type and drug use

Survey respondents, in the face-to-face group only, were asked two additional questions to assess their crash history in relation to their licence status and drug type when driving. There were 191 responses to this question showing 74% of those with a learner licence caused a crash, as did 60% with no licence, 47% with a full licence and 46% with only a restricted licence.

When asked whether they had caused a crash while under the influences of a drug, 77% of those who had a learner licence said they did, as did 62% of those with no licence, 47% with a restricted licence and 46% with a full licence. A summary of the 191 who responded is shown in figure 4.47.

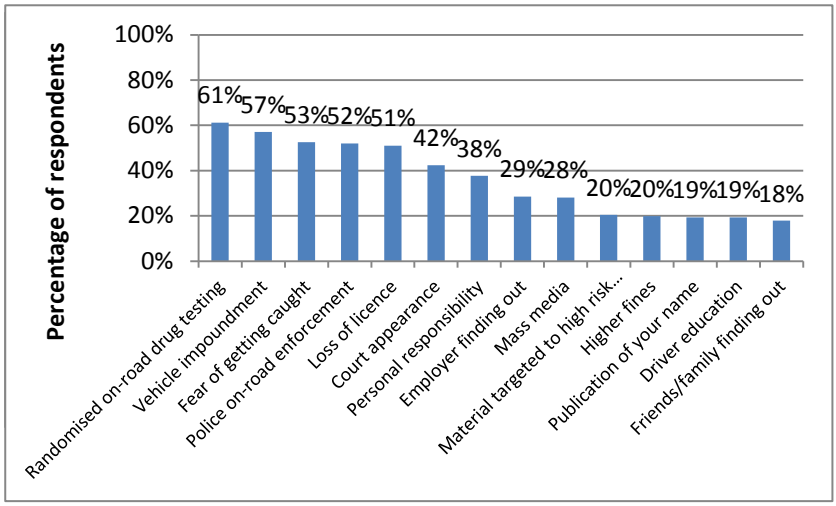
Figure 4.47 Crashes and licence type (face-to-face group)



A second question asked the 191 subjects what drug they had used when they caused a crash.

The answers showed 71% said alcohol and a mixture of drugs, 56% said methamphetamines, 49% said benzodiazepines and 48% said cannabis. A summary of the 191 who responded is shown in figure 4.48.

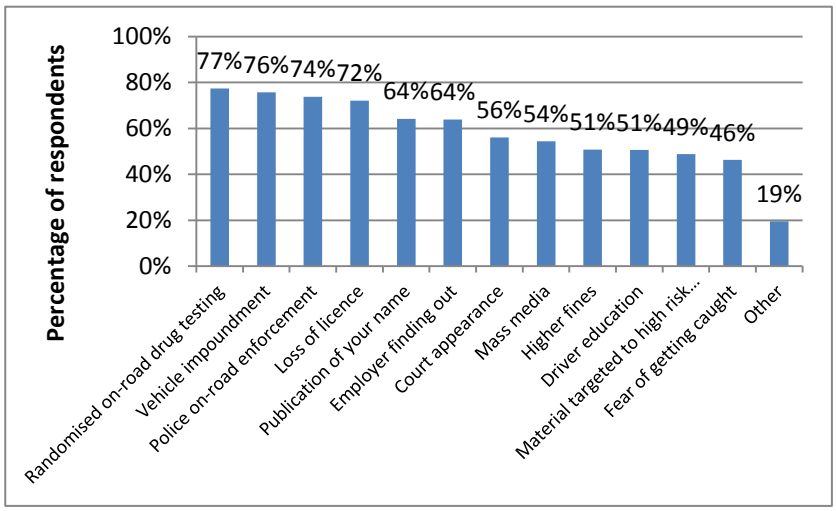
Figure 4.48 Crashes and drug type (face-to-face group)



4.5 Countermeasures

Survey respondents were asked to identify which countermeasures would cause them to think carefully before taking drugs and driving. Respondents were provided with a list of responses to choose from. This list included the common countermeasures used in drink-driving campaigns, and found in the literature for drug-driving countermeasures in other countries. Responses for telephone and internet surveys were received from 1206 people, while 68 respondents chose to skip this question. Results are shown in figure 4.49 below.

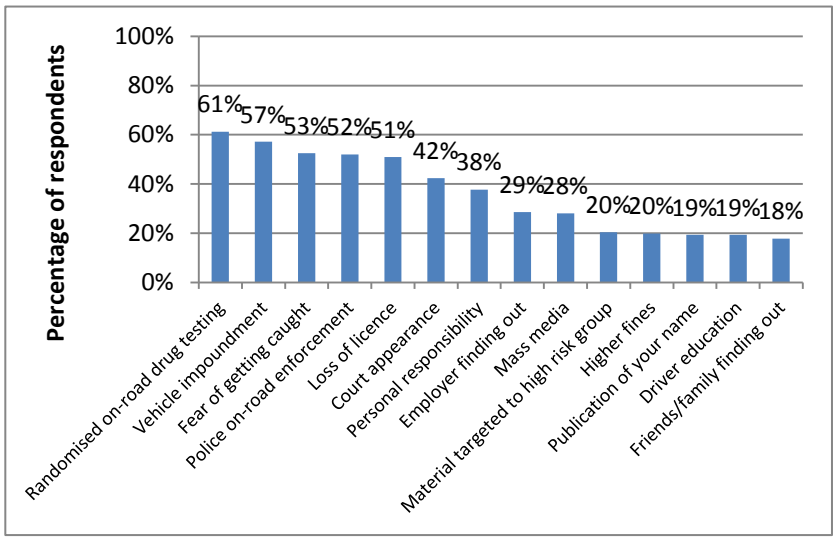
Figure 4.49 Countermeasures identified by general population (telephone and internet surveys)



Roadside drug testing, vehicle impoundment, on-road enforcement by Police and possible loss of driving licence were identified by respondents as the actions they considered would have the strongest effect in making drivers reconsider their decision to take drugs before driving.

The responses identifying the countermeasures from the face-to-face group are presented in figure 4.50.

Figure 4.50 Countermeasures identified by the face-to-face group survey



The key difference in the responses from the two groups is that fear of getting caught appears as the third most influential factor for the face-to-face group but had the lowest importance for the general population. Another difference is that the threat of an employer finding out or publication of name as a result of any charges was a major deterrent for the general population, but was considered to be less important by the face-to-face group.

The countermeasures identified were further analysed through study of the responses by age group. The top five results for each of the age groups are presented in table 4.3. The results show that randomised on-road drug testing was the most popular counter measure for respondents under the age of 55. The general trend from this analysis shows that the top five measures are similar across the age groups.

Table 4.3 Countermeasures preferred by age for the general population (telephone and internet surveys)

	16–25	26–35	36–45	46–55	56–65	65+
1st	Randomised on-road drug testing	Randomised on-road drug testing	Randomised on-road drug testing	Randomised on-road drug testing	Vehicle impoundment	Vehicle impoundment
2nd	Loss of licence	Police on-road enforcement	Police on-road enforcement	Vehicle impoundment	Randomised on-road drug testing	Randomised on-road drug testing
3rd	Vehicle impoundment	Vehicle impoundment	Vehicle impoundment	Police on-road enforcement	Loss of licence	Publication of your name
4th	Police on-road enforcement	Loss of licence	Loss of licence	Loss of licence	Police on-road enforcement	Police on-road enforcement
5th	Employer finding out	Employer finding out	Employer finding out	Publication of your name	Publication of your name	Loss of licence

The results for the face-to-face group correlated by age are presented in table 4.4. The fear of getting caught was considered a major deterrent for this group, with court appearances being a particular concern for drivers under the age of 25.

Table 4.4 Countermeasures preferred by age for the face-to-face group

	16–25	26–35	36–45	46–55
1st	Vehicle impoundment	Randomised on-road drug testing	Randomised on-road drug testing	Randomised on-road drug testing
2nd	Randomised on-road drug testing	Fear of getting caught	Police on-road enforcement	Vehicle impoundment
3rd	Police on-road enforcement	Vehicle impoundment	Vehicle impoundment	Fear of getting caught
4th	Loss of licence	Police on-road enforcement	Fear of getting caught	Loss of licence
5th	Court appearance	Loss of licence	Loss of licence	Police on-road enforcement

Note: Within the face-to-face group data set, there was not a large enough response from people over the age of 55 to collate countermeasure results.

4.5.1 Driving under the influence of drugs

Respondents who reported driving under the influence of drugs in the general population were also analysed in isolation. The size of this case group was small with 21 responses. Responses received from this group were similar to the overall sample set with respect to the factors that would cause them to think carefully before taking drugs and driving. Randomised on-road testing and vehicle impoundment (24% each) were identified as the actions most likely to have an impact on these drivers, while loss of licence (14%) was also important.

4.5.2 Passengers in a car where the driver consumed drugs

A total of 63 valid responses in the general population (telephone and internet survey groups) were received from people who had been a passenger in a vehicle where the driver had used drugs during the previous three hours. The possibility of their friends and family finding out about the incident was the most common response received from this group when asked about the factors that would cause them to think carefully before taking drugs and driving or getting into a car as a passenger with someone who had been taking drugs. Randomised on-road testing, vehicle impoundment and loss of licence were the other key factors identified by these respondents.

In addition, the 48 responses received from the telephone survey, excluding the internet survey, showed that loss of licence (21%) and randomised on-road testing (17%) were most likely to have the strongest impact on preventing these respondents from driving under the influence of social drugs in the future. Court appearances, vehicle impoundment and a fear of getting caught (10% each) were also among the key identified countermeasures.

5 Discussion – prevalence of drug-driving

This study was conducted to understand the relationship between drug use and driving, the risks associated with drug-driving and the perceptions and behaviour of drug drivers. It was also developed to understand countermeasures that might manage this issue. The study looked at both the general public (through telephone and internet surveys) and habitual drug takers in the main drug groups (the face-to-face group).

Existing research into understanding how to deal with these two groups indicates that road safety practitioners need different approaches for each group. The aim of this study was to present information about both groups to better inform opinion and contribute to appropriate countermeasures to manage this emerging issue in New Zealand.

The results of the study indicated that a total of 47% of respondents in the general population surveys said they drove after drinking or using drugs. The overwhelming majority of those respondents (80%) who admitted to drink/drug-driving only drank alcohol. A total of 9% of respondents from the general population, said they drove under the influence of social and recreational drugs (only 2% from the telephone survey). The remainder of the general population used a combination of alcohol and drugs.

All of the participants who participated in the face-to-face interviews admitted to drug-driving. A total of 79% had been involved in at least one crash and of these 57% reported that they were at fault. A total of 80% of the group also had a previous driving conviction. In addition, almost half of the entire sample had been passengers with drink/drug drivers.

The results from the three questionnaire surveys in the current study indicated that drug-driving is well established in New Zealand. This reflects trends overseas.

This is consistent with most overseas research, where alcohol is the most common substance used when driving under the influence of drugs. Most respondents understand the risks associated with drink-driving and state that they know the messages associated with these risks (Barbone et al 1998; Kelly et al 2004; Longo et al 2000b; Movig et al 2004; Neutel 1998; Ogden and Moskowitz 2004; Papafotiou et al 2005; Ramaekers et al 2000; Ramaekers et al 2004a; Ronen et al 2008; Shinar 2006).

5.1 Prevalence of drug types in drug-driving

It is interesting to note that 16.4% of the general population, who drank alcohol and drove, believed they drove over the limit in the last 12 months. This is compared with the face-to-face group where 70.4% of drink drivers reported driving over the limit.

In the current study just under half of the general population (46.5%) indicated they either took prescription, social or recreational drugs and alcohol, but as in the majority of overseas research, most (43.6%) of this group continued to drink and drive on a monthly basis. In the face-to-face group, among those who used alcohol, 84.6% drank and drove and did so at least weekly.

In terms of other drugs and driving, respondents in the general population indicated the second most common drug was analgesics (pain killers) and then cannabis, but for the face-to-face group, 'alcohol and other drugs' was the next most common combination. The other drug with alcohol was usually cannabis.

The high level of analgesic use in the general population was a surprise, but to put this into context it represented only 28 subjects out of the 1000. The road safety literature on the risks associated with analgesics indicates that most over the counter drugs and the majority of prescribed analgesics have very

little effect on the driving task. As they are primarily intended to control pain, they tend to produce little in the way of impairment when driving (Beirness et al 2003; Raes et al 2008).

The second group, from the internet survey (241) had a slightly different profile, which may reflect the type of person using this medium. This group indicated that out of the 206 people saying they used drugs and drove, 68% said they drank and drove, 16% used prescription analgesics, 5% cannabis, 2% party pills, and 1% benzodiazepines.

Respondents in the face-to-face group indicated they were more likely to use a larger number of drug combinations (three drugs or more) before driving (41.3%). This was followed by alcohol and cannabis 23%, methamphetamine 12.8% and benzodiazepines 11.2%.

Interestingly when this group was asked what drugs they mainly used when driving, the majority reported they used more than one substance. They indicated that cannabis was the most popular drug (61.6%) taken when driving. This was supplemented by survey respondents indicating that alcohol and methamphetamines were also used in combination with cannabis for driving trips at 41.4% and 38.4% respectively. When asked what percentage of their driving was done after they had taken drugs, those who used alcohol said it was 84.6% of their driving time, those who used cannabis 90.6% and those who used methamphetamines 98.0%. It is likely that the proportion of people using alcohol is lower due to the realtively higher risk of getting caught. The higher occurrence of drug-driving with cannabis and methamphetamines reflects the perceived low risk of driving under the influence of these drugs in the study group and the fact that they believe they are less likely to be caught drug-driving.

The emerging pattern from research in other countries indicates that the prevalence of illicit drug use in driving is probably in the range 1%–5%, whereas licit drugs are probably in the range 5%–15% (Verstraete 2004).

In the current research the prevalence of illicit drug use within three hours of driving for this New Zealand sample of the general population was 9% (only 2% for the telephone survey responses) and for licit drugs (this sample included drugs and alcohol) was 47%.

This is quite similar to the results from Poulsen (2010) who reported in *Alcohol and other drug use in New Zealand drivers 2004 to 2009*, that from an analysis of blood samples from 1046 deceased drivers, 546 (52%) were not impaired by alcohol or other drugs. Five hundred (48%) of the deceased drivers had alcohol or other drugs in their blood that may have impaired their ability to drive safely.

Similar to the results from the current research, Poulsen found that from the total sample, 135 used alcohol alone (27% of the possibly impaired drivers); 96 used cannabis alone (19% of the possibly impaired drivers); 142 used a combination of alcohol and cannabis, but no other drug (28% of the possibly impaired drivers); 127 used some other combination of drugs, many including alcohol and/or cannabis (25% of possibly impaired drivers).

A second study, Hammond (2009) *Drug driving in New Zealand: a survey of community attitudes, experience and understanding*, found from a sample responding to an internet survey of 1164 New Zealanders, that driving under the influence of cannabis was the most common drug-driving behaviour (24.5%) followed by alcohol (21%), opiates (6%), party pills (4%) and a combination of drugs (11%).

These figures are consistent across the three studies, but in the current survey the prevalence of drug taking in the general population was higher for alcohol, cannabis and a mixture of alcohol and cannabis.

In a 2004 Australian study, respondents indicated that in the preceding 12 months the sample indicated drug use as 91.6% alcohol, 24.0% cannabis, 13.2% methamphetamines and 4.1% benzodiazepines. In an

associated study when asked about drug use when driving, a sample of 6801 internet respondents reported drug-driving use as 12.6% alcohol, 12.3% cannabis. 6.9% methamphetamines and 4.0% benzodiazepines (Walsh and De Gier 2004).

The current study indicates that drug use in these three groups is higher in the New Zealand samples compared with that found in Australia in 2004. This is an interesting result when compared with worldwide research. The following studies indicate that generally there is a consistent pattern showing some similarities between these countries in drug-driving: Australia (Aitken et al 2000; Darke et al 2004; Jones et al 2005; Lenne et al 2001), Canada (Dussault et al 2002), Denmark (Behrensdorff and Steentoft 2003), Netherlands (Assum et al 2005; Mathijssen 1999), Norway (Assum et al 2005), UK (Glasgow) (Assum et al 2005) USA (Lacey et al 2007).

In most of these studies, the drug most frequently detected in the general driving population was cannabis. However, in Australia, methamphetamine was more prevalent than other countries (quoted in Raes et al 2008 – P. Swann, personal communication).

Within the New Zealand general population, 0.4% reported that they used methamphetamine and drove. In the face-to-face group survey 12.8% said they used other drugs and methamphetamine, but when asked which drug they mainly used, 38.4% said methamphetamines.

In the study conducted in the USA, cannabis was the most prevalent drug, followed by cocaine and amphetamines.

5.2 Profiles of the main drugs

5.2.1 Cannabis

The New Zealand Drug Foundation study (Hammond 2009), which included in-depth interviews with 12 key experts from around New Zealand with knowledge and experience of the drug and alcohol and/or road safety sectors and an internet survey of 1164 New Zealanders, found driving under the influence of cannabis was the most common drug-driving behaviour (24.5%) for internet respondents. However, they advised caution with these results because people who used drugs were over-represented in the sample compared with estimates of the rates of drug use in New Zealand's general population. This suggested the findings might have over-estimated incidences of drug-driving in the general population.

In the current study, 3.8% of the general population said they used cannabis and drove, but in the face-to-face group 69.4% took either cannabis alone or cannabis with other drugs. When this group was asked about the main drug they used, if they reported taking a mixture, 61.6% reported cannabis: 50% took cannabis seven days a week, 92% drove within three hours of taking cannabis and 60% drove daily.

As may be expected for the face-to-face group, cannabis use started early in life, mostly between 10 and 15 years. This is similar to alcohol but lower than for those taking both methamphetamines and benzodiazepines.

Typically those in the face-to-face group, who used cannabis and drove, said they would use cannabis seven days a week or on Fridays and Saturdays, drive daily with passengers and drive more than 50km. Of note with this group was that when asked if the drug affected them, slightly more than half said it did not affect them, and of those who said it did affect them just under half said it was positive, with a negative effect for about one third.

5.2.2 Benzodiazepines

Benzodiazepines are the second most prevalent drug/medicine found in drivers in Canada, Denmark and the Netherlands (Beirness 2005); Behrensdorft 2003; Bernholf 2005), and Norway (Assum et al 2005). In the current study, among general population respondents, benzodiazepines came third behind cannabis and analgesics.

In the face-to-face group, most of the subjects taking benzodiazepines did so on a medical prescription. However, 35% did not. Respondents said they started taking this medication later than alcohol and cannabis. The one clear drug of choice was Valium (diazepam) with over half the group saying they took it. As a high half-life drug, this has added implications for road safety issues. Not surprisingly, almost the entire sample said they drove, and over 88% drove within three hours of taking the drug.

The drug-drive pattern indicated daily use of benzodiazepines and daily driving. More than half the respondents believed the drug affected their driving mainly in a negative way. This is somewhat surprising given that many of these drugs are prescribed to reduce anxiety and associated problems that may help with the driving task. Respondents also tended to drive with passengers, more than 50km per trip. Being a daily occurrence they drove in a similar pattern each day.

In the face-to-face group the reported use of benzodiazepines was only fourth behind a mixture of drugs, alcohol and cannabis and methamphetamine only. This may reflect the way the information was gained, mainly in prisons, and the overall screening process used.

5.2.3 Methamphetamines

It was clear that the predominant pattern of drug use in the face-to-face group indicated multi-drug taking, normally involving cannabis, alcohol and methamphetamines.

The pattern in New Zealand in relation to methamphetamines has had a high media profile in the last five years. This has highlighted the issue graphically and communicated a strong message on the dangers and risks associated with its use.

The present study looked at 52 users of methamphetamines and was interested in understanding the profile associated with this drug and driving. People using the drug said they started at 16–20 years of age. Users said they took it for seven days a week and/or until they ran out. This tended to be a different pattern from other drugs that were used on a more social and casual basis. It is therefore not surprising that 98.1% of this group said they drove daily after taking the drug and within a three-hour time frame.

These respondents overwhelmingly believed that the drug affected their driving, but most believed it affected them in a positive way (43% compared with 38% negative). Most alarming was that they said they drove with passengers over 90% of the time, and tended to drive long distances of 50km or more almost every day of the week.

5.3 Passengers

As a secondary set of questions respondents were asked if they had been a passenger in a vehicle where the driver took drugs and alcohol. In the general population about one third said they had been passengers in this situation. The reported drugs used were overwhelmingly alcohol, followed by cannabis and analgesics. In the face-to-face group almost the entire sample said they had been in this situation. The reported drug use was split almost equally between cannabis and alcohol, with methamphetamines third.

In terms of their own safety the general population reported feeling safe as passengers, even though they said that 16% of the drivers had been, in their opinion, over the limit when drinking alcohol. In the face-to-face group respondents generally said they felt very safe.

5.4 Effects on the driving task

Lococok et al (2007) states that:

> *Driving is a complex information processing task and is one of the most challenging activities people engage in on a daily basis. Driving is a dynamic task, because the roadway scene and the information a driver must process from it (such as signs, signals, pavement markings, road curvature, position, and distance of other vehicles) change constantly as a driver proceeds along his or her path. Furthermore, information about the driving environment must be processed very quickly when driving at high speeds.*

'A driver's capability to respond to traffic situations appropriately is dependent upon how he or she processes information, which can be described using the driver information processing model.' (Verstraete 1999).

This model indicates that different drug groups can negatively affect individual driving performance and driver risk. In the current study, driver risk, driver risk perception and risk exposure were assessed to better inform road safety practitioners of how the survey groups saw their risks.

Overall the results indicated that within the general population and in the face-to-face group most respondents perceived that they were good drivers. They considered themselves to be safety conscious people.

Also as expected almost all (96.9 %) of the general population considered they were law abiding. This dropped to just over half in the face-to-face group (55.1%).

In terms of risk taking, as expected with these two groups, the face-to-face group respondents indicated they enjoyed taking risks, and when it came to driving over half did take risks.

Risk by age shows an interesting issue. Within the general population, older respondents said they were more likely not to take risks. For the 16 to 25 year old general population group 14% said they enjoyed taking risks compared with 39% of the same age group in the face-to-face group. The face-to-face group indicated they were engaged in more risk taking at every age apart from the two older groups 56 to 65 and 65+ which had an atypical profile, possibly due to the low numbers in this predominantly prison-based population.

The most concerning response is within the 16 to 25 year old group, where 58% of the face-to-face group stated they 'enjoy taking risks', or 'more often I take risks when driving' compared with 29% of the general population.

International research indicates that the use of cannabis, the most widely used drug after alcohol, poses a moderate risk of impairment. Individuals under the influence of cannabis may be able to compensate for impairments while driving for short periods of time. However, they may be less able to compensate for impairments when driving is monotonous or prolonged, or in situations that require greater attention and skill.

In the face-to-face group, 54% of those who took cannabis believed the drug did not affect their driving and if it did 46.2% said the effect was positive. In addition, 28% of this group reported they drove more than 50km at any given time, with Friday and Saturday the main days and 92.2% drove with passengers.

When asked about perceived risk, most face-to-face group respondents thought people in general were at more risk when they took drugs and drove, particularly when driving with a mix of alcohol and drugs, or alcohol by itself. However, when it came to themselves they indicated that when under the influence of either alcohol or drugs they tended to note no difference in their driving, with only 3% saying it was difficult to drive. They also reported that they felt very safe driving; they did not have to compensate in any way to drive better. They said they had very good knowledge about the risks associated with alcohol and drug taking and driving.

Mallick (2007) noted that 'understanding the impairing effects of illicit and pharmaceutical drugs is important when considering issues around drug driving'. The researchers wanted to assess this with the face-to-face group to see whether different drug types were seen as affecting the driving task in different ways (Shinar 2006; Menetrey et al 2005; Ramaekers et al 2006; Lamers et al 2001; Sexton et al 2002; Walsh et al 2004; Mills et al 2001; Wesensten et al 2005).

5.5 Roadside screening

These studies showed there are a number of indicators that might be developed as possible 'screening items' to assess the actual behaviour noted by drivers and provide early warnings or indicators when looking for drug drivers. These observations would need to be recorded by a police officer in a structured manner (in accordance with applicable legislation) and incorporated into a roadside test allowing officers to require the driver to undergo further evidential testing.

Based on the findings of previous research and in particular the known cognitive, behavioural and observed side effects for drug takers, the current study assessed face-to-face group respondents against a number of key measures to indicate the perceived effects on their driving of the drugs they took.

The main indicators were …. 'it changes my mood', 'it changes my reaction time'; 'I cannot concentrate'; 'I find it hard to coordinate my movements'; 'I am not that good with my vision'; 'my memory is not good'; 'I get lost as to where I am', and 'my judgement is not as good'.

Only two effects were noted by the majority of face-to-face group respondents as true for them. These were 'it changes my mood' and 'it changes my reaction time'. Two others 'my memory is not good', and 'my judgement is not good' received a third to 40% response agreement. In addition to their perceived behaviour they were asked to report their experience when driving under the influence of drugs. The most frequently reported experiences were driving over the speed limit (76.5%) and getting themselves into dangerous situations (61.7%), which is consistent with their risk and associated crash history where 56.6 % said they were involved in a crash.

While different drugs will induce different effects in relation to the driving task, these results may help those trying to observe drug drivers. If they can be tested at the road side, the results may assist with the screening task for an enforcement approach.

In November 2009, New Zealand introduced the first roadside screening test for drug impairment as a way of assessing this issue and legally managing the problem. The Land Transport Act 1998 gives NZ Police powers to deal with the problem of people driving under the influence of drugs. The drug-driving provisions of the Land Transport Act 1998 came into force on 1 November 2009 (through the Land Transport Amendment Act 2009).

It is an offence to drive while impaired and with evidence in the bloodstream of a qualifying drug. The presence of a qualifying drug alone is not sufficient for an offence; there must first be impairment as demonstrated by unsatisfactory performance of the compulsory impairment test. When a police officer has

'good cause to suspect' that a driver has consumed a drug or drugs, the officer may require the driver to take a compulsory impairment test.

Grounds for having good cause to suspect include erratic driving or, if the driver has been stopped for another reason, appearing to be under the influence of drugs. An example of the latter is the person stopped at an alcohol checkpoint who is behaving in an intoxicated manner but passes a breath alcohol test.

If the driver does not satisfactorily complete the compulsory impairment test, the police officer may forbid the driver to drive, and require the driver to provide a blood sample.

The compulsory test includes:

- an eye assessment – pupil size, reaction to light, lack of convergence, nystagmus (ie abnormal eye movement - irregular eye movement can be a marker for drug impairment)
- a walk and turn assessment
- a one leg stand assessment.

It is based on a test used in the UK and adapted for the New Zealand Police by experts from Swinburne University of Technology, Melbourne.

The findings from this study may help to enhance this screening test or provide an additional context when making decisions as part of the overall test. The self-reported effects noted by drug users may provide information supporting future studies of the effects of drug taking on driving, associated or actual impairments, the degree of impairment and risk of road crashes. This should be considered as a future research opportunity.

5.6 Crash history and licence status

The drug user group respondents were also asked for their crash history. This information indicated that this group presented a major road safety risk and possibly an on-going risk. Of the 196 respondents, 79% had been involved in at least one crash and of these 57% reported that they were at fault. Of more concern was that 80% had had a previous driving conviction.

Their driver licence status was also a concern. In the face-to-face group 29% of respondents said they drove but did not have any form of driver licence, 31 % said they did have a full licence, 39% said they drove on a learner or restricted licence. Given that most drove at all times of the day and night, predominantly with passengers, many of these trips would be undertaken when they were not meeting the conditions of their licence. Add to this the fact that most reported they drove under the influence of drugs, alcohol or a mixture of drugs and alcohol.

This raises the issue of further research into why this group does not have a full driving licence and highlights the opportunity to develop programmes including through the licensing process to reduce the noted risks associated with this group when they drive and when they consider driving under the influence of drugs and/or alcohol.

6 Discussion – countermeasures

The other key outcome for this research study was to assess the perceived deterrent activity that might impact on the behaviour of those who chose to take drugs and drive.

A large body of research has been conducted into deterrence measures with alcohol but to date there is little conclusive evidence to indicate how interventions such as education, mass media or enforcement might moderate drug-driving behaviour.

Due to the lack of comprehensive understanding of drug-impaired driving, as opposed to drink-driving, as an issue of concern, it is not surprising that little has been done to develop and evaluate appropriate interventions. Research is still focused on assessing the extent of the problem, and on developing measures and methods for identifying drug impairment. Drug-impaired driving is a quantitatively and qualitatively different issue from alcohol-impaired driving. This has important safety implications, as well as implications for developing effective countermeasures.

However, the emerging pattern shows that drug-driving is becoming more frequent, along with a preference for particular drug types. In all studies published since the 1990s, there has been a consistent trend indicating a gradual rise in the number of people driving under the influence of drugs. The drug most commonly used, after alcohol, has become cannabis.

Some of the interventions for alcohol-impaired driving may prove to be useful, but overall, drug-impaired driving presents a more complex issue. Because of the diversity of drugs that can impair driving, it may be necessary to develop unique strategies for broad drug categories. Also, the illegality of certain drugs presents a challenge. The general population is reluctant to provide information about their illegal drug use for research purposes. Drug-impaired driving legislation will need to be developed in conjunction with other drug laws, and in conjunction with other interventions such as remedial treatment. It should not be assumed that countermeasures for alcohol-impaired driving would be as effective for drug-impaired driving. Studying recent research that has looked at this area, and in particular, papers that have contained a section on countermeasures, it is noted that in recent times no one single idea seems to have been developed that indicates how this issue might best be addressed. Instead the research indicates that it is very much at the 'thinking stage'. Research since 2003 tends to explain what is happening in this area without any comprehensive analysis of the outcome(s) of methods used.

As noted by Jones et al (2003) 'Countermeasure approaches in the United States and Europe have involved the use of the Criminal Justice System to enforce drugged driving laws using methods similar to those used in enforcing alcohol-impaired driving laws'. They found no evaluations of the impact of any drug-driving countermeasure on crashes, either in the USA or Europe. They believed that this might be expected, given the lack of any databases containing objective measures of the presence of drugs in crash-involved drivers.

6.1 Enforcement

There is some thinking in Australia about what could be used to deal with the drug-driving issue. Mallick et al (2007) found that according to the research literature the most effective drug-driving prevention initiatives include both enforcement and public education. They argue that drug-driving prevention initiatives should focus on increasing both the perceived and actual risks of apprehension for drug drivers, because they believe there may be a sub-group of drug drivers who would decide not to drive under the influence if they felt the risks of apprehension were higher.

One of the findings of most concern from Mallick's study was an evaluation of roadside testing. This method has almost become the 'go to' approach as the ultimate way to deal with this issue, and given the success roadside testing has had in the drink-driving area it is understandable that this has happened. However, the fundamental reason roadside testing has worked so well on the drink-drive population is because it is based on the legal setting of drink-driving levels and the assumption that at a certain level drivers will be impaired.

In the drug-drive population the situation is far more complex and to date there has been no clear evidence as to the impairment level and risk taking. It is further compounded by the fact that a number of the 'at-risk' group take several drugs and often mix them with alcohol.

Internationally, there is a body of research available on the effect of alcohol on driving ability. Currently, there has not been a similar body of international research that establishes the relationships between drug dosages and impairment levels and crash risk for a number of drugs. These relationships are a lot less predictable for a number of drugs which has made it difficult to set legal limits for driving.

Mallick et al (2007) also noted that while there is considerable evidence that roadside breath testing has been effective in reducing drink-driving there is not a lot of evidence of the effectiveness of this in the deterrence of drug-driving. They start that 'although these findings indicate that RDT [randomised roadside drug testing] 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'.

In terms of sobriety tests they argue that these form of testing and the results are both 'politically and practically' difficult and due to the number of different reasons for drug use, the use of a test for sobriety and impairment is naturally complex. They state that '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)'

However, they do believe that because it can detect the presence of a drug, sobriety testing may be an effective strategy in removing impaired drivers from the roads.

As in other research in this area they found that roadside testing is perceived by respondents to be an effective method of improving road safety. However, some respondents expressed a preference for public education campaigns because of the illegal nature of many drugs, believing such campaigns may help drug drivers access drug-driving information anonymously.

6.2 Media campaigns

An extensive summary of approaches collated by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA 2007) found there was a need for prevention techniques to reduce driving after taking drugs.

They noted that since 1999 the majority of European countries have carried out mass media campaigns involving the distribution of leaflets and posters and the construction of websites that describe the health risks of drug abuse and driving. Usually they focus on alcohol, though some are drug-specific.

One approach was to focus on the illegality of such driving, stating the laws and penalties, as is done in France for cannabis. Most campaigns could be grouped according to the drugs highlighted and target audiences.

The research suggests that, as consumers come from different socio-economic classes and age groups, a 'one size fits all' campaign may not be the most effective (Siebers et al 2003); older benzodiazepine users

will apparently ignore messages aimed at young cannabis users and vice versa, while neither will feel that warnings about alcohol apply to them.

Nine countries reported publicity campaigns, which could be grouped into those aimed at general users, school pupils, people who attend at risk recreational settings and users of pharmaceuticals.

Campaigns were run in schools in Belgium, the Czech Republic, Luxembourg, Austria and Poland, whereas campaigns outside schools but aimed at young people took place in France, Sweden and the UK.

6.3 Education

To a lesser extent there have been some initiatives in the specific education area. These have concentrated on incorporating education material into the curriculum as part of driving school programmes. These methods generally involved experts in the field or peer group educators but to date there is little research to indicate the long-term effect of this.

As well as the peer trainers in driving schools, programmes involving direct intervention by peers have been reported, similar to the drink-driving approach in New Zealand run by Students Against Driving Drunk (SADD). In these schemes, volunteers aged 17–29, attend various events and offer saliva tests to young people to detect cannabis and amphetamines. If the test is positive, drivers are free to decide whether or not to drive home. There are also 'designated driver' programmes.

6.4 Random roadside testing

Most researchers looking into these issues have concluded that roadside enforcement is one of the better methods to deal with this issue.

There is a consistent theme that because of the success of roadside testing for alcohol, it could be the best method for drug-driving. The current research in EU counties is clearly developing this focus. This is also true of what has occurred in Australia. With the introduction of roadside testing it is now becoming a major focus for the Australian Police in their roadside enforcement.

However, as with alcohol, there is some evidence to suggest that this method best impacts on social drinkers and recreational drug users (Cameron 2008). The argument made by Cameron is that because some drug drivers are drug dependent, many of the programs currently being developed will have little effect on them, and roadside testing will not have the same deterrence effect on this group.

Therefore a key issue to consider is that targeting the casual recreational drug user who drives may have the desired effect. However, as with alcohol, where it has long been considered that a large proportion of the social cost comes from the habitual or alcohol-dependent drink driver, such countermeasures may not be effective for the total population.

6.5 Relationship between drug use and drug-driving

One novel study by Davey et al (2005) looked at the responses from drug drivers and, in particular, whether they thought they would get caught drug-driving. This was studied by qualitative interviews investigating the relationship between drug use and drug-driving.

The research used the actual comments from the subjects. The authors noted that ……

> *One of the most identifiable themes to emerge from the interviews was that cars provided a common space to use drugs away from public view. All of the interviewees had used drugs in*

the car. Everyone had used them in a car both as a driver and as a passenger. The car is an essential part of the drug use behavior, providing ready access to drugs and a place to use. Cars enable use at any time.

For dependent type users, cars appear to be a major source of transport around using drugs and a convenient place to use.

Interestingly, for almost all interviewees, the illegality of the driving behaviour seems to have little significance as a deterrent across drug use types and categories.

The illegality of drug driving was often subsumed by the illegality of drug use. For the most part, deliberate changes in one's driving behaviour were outcomes of avoiding detection of drug use rather than modifying driving behaviour because of safety implications.

Where the interviews did identify compensatory behaviours it was almost exclusively among social recreational type users who timed their driving after consuming drugs.

For recreational and social users almost all interviewees reported that at some stage they noted physiological or psychological changes that may affect their driving. However, these drug effects were not necessarily viewed as an impairment or barrier to driving. Interviewees generally remained unconvinced that drug driving held any particular safety issue for them personally.

Very few dependent users felt that their driving skills were affected by drugs. Even when interviewees did describe themselves as unsafe drivers they acknowledged that this awareness did not deter them from driving the car.

Almost all interviewees thought it was unlikely that they would be to be caught by police for driving under the influence of an illegal drug. They believed that police don't test for illicit drugs because they do not have the technology for an easy roadside test and they are poorly trained at detecting someone under the influence of drugs."

This research clearly gives a very good insight into the thinking and behaviour of both the recreational drug user and those more dependent on drugs.

The study identified that the majority of people who drive while under the influence of illegal drugs had also consumed alcohol. In turn, this statistic indicates that the majority of drug drivers would be captured through existing mechanisms to manage drink-driving in New Zealand

6.6 Countermeasures identified in the study

The aim within this study was to look at a range of countermeasures that might change the behaviour of drug drivers or the more dependent drug user group in New Zealand.

When the same question was asked of the general population and of the face-to-face group, there were clear differences between the responses of the two groups. This supports the findings of other studies.

The top three countermeasures considered by the general population to have the most impact in deterring them from drug-driving were 'vehicle impoundment', 'randomised on-road testing' and 'on-road enforcement'. The least effective countermeasures were 'fear of being caught', 'higher fines' and 'targeting at-risk groups'.

As a follow up to this the general population group was asked, 'Which one do you think would have the most impact on you?' 'Loss of licence' was rated highest followed by 'vehicle impoundment'. The option

considered to have the least impact on them was 'targeting at-risk groups'. This may have been because they did not see any possibility of their being 'drug drivers' or part of an at-risk group.

When the same question was asked of the face-to-face group, the top three deterrents were, 'randomised on-road testing', 'vehicle impoundment' and 'fear of getting caught'. The lowest were 'friend and family finding out', 'publication of your name' and 'driver education'. This may reflect that drug-driving is not a big issue in their social and family situations. Their extended social networks and family may have similar values and behave the same way as they do in relation to drug-driving.

The deterrents consistently rated highly were roadside testing and enforcement measures. Social media has long been used in New Zealand to deliver messages against speed and drink-driving. It is interesting that for both groups this was not rated highly. However, for the general population almost 60% felt this would have some impact compared with 29% for the face-to-face group.

This is an interesting result given that at the time of this research the NZ Transport Agency had run a very visual mass media campaign that highlighted the drug-driving problem and there were a number of media accounts that this was well received by the general public.

It is clear from this research that habitual drug takers and the general public have similar views when it comes to countermeasures, although the behaviour and risk taking of the two groups are different.

When analysing the data, the age group of respondents and their views were assessed to see if age had a different impact on the kind of countermeasure considered to have more effect.

The result indicated that 'randomised on-road drug testing' was still ranked highest by all three groups, but as the general population got older (56 to 65+) vehicle impoundment became the highest rated. This was also the case for those aged 16 to 25 in the face-to-face group, which may reflect the importance for them of their vehicles and mobility.

In conclusion, roadside testing and vehicle impoundment were seen as the countermeasures that might have the highest deterrent effect. This was followed by 'enforcement' to support this. 'Loss of licence' was also important. The general population ranked mass media at 6th out of 13 as a general deterrent to support the testing and enforcement activities. This was lower among the face-to-face group.

6.7 Overall findings

The main objectives of this study were to review current knowledge of driver impairment due to drug use, to report on current levels of prevalence found in various subsets of drivers, to investigate the risks faced by drug-driving and to recommend a range of countermeasures that could be implemented in New Zealand (see section 7.2).

The overall outcomes for the use of countermeasures that would influence the drivers in this study are outlined below.

- The general population surveyed in this study considered that randomised on-road testing for drug use would discourage drug-driving.
- For changing behaviour in the drug user group, more enforcement and penalties such as vehicle impoundment were considered the most effective deterrents.
- Social media may be important for raising general awareness of the drug-driving issue in the general population and may help to establish the context for roadside testing and enforcement.

- Given that the findings of this study are fairly consistent with the findings of similar studies in other countries, it may be productive to use countermeasures that have been tested internationally.

7 Conclusions and recommendations

7.1 Conclusions

The findings from this study were consistent with findings from other studies. The results from both a general population group and a face-to-face habitual drug user group, showed a pattern consistent with other research.

To this extent, actions taken to counter the drug-drive issue in other countries may have a similar effect on the New Zealand population. There are, however, some subtle differences that should be considered. The scope of this research meant that a more detailed analysis could not be undertaken to establish the impact of such differences.

The following summary provides a positive starting point to understand the complexity of this issue and a way forward to develop countermeasures for what is becoming an established road safety issue.

7.1.1 Summary of findings from the telephone and internet survey of the general population

- A total of 68% of respondents said they drink alcohol on a regular basis (internet survey results only).
- A total of 47% of respondents said they drove after drinking or using drugs.
- Of the group who did drink/drug-drive the overwhelming majority (80%) only drank alcohol.
- A total of 2% of telephone survey respondents said they drove under the influence of social and recreational drugs.
- The most common recreational drugs taken included cannabis, 'P', party pills and ecstasy.
- There was also a high use of analgesics, but because these were non-narcotic analgesics (paracetemol or aspirin) they were perceived by the interviewees as not affecting the driving task.
- Daily usage was prevalent amongst participants taking prescription drugs and a small proportion of those who drank alcohol.
- Randomised on-road drug testing and vehicle impoundment were considered the most appropriate countermeasures to reduce drug-driving.
- Mass media and driver education were considered to have some impact on the respondents themselves.

7.1.2 Summary of the face-to-face group survey

- The most common drug option among participants in the drug user group was alcohol and other drugs, usually cannabis.
- This group was likely to use a number of drug combinations (three drugs or more) before driving (41.3%). Twenty-three percent used alcohol and cannabis, 12.8% methamphetamine and 11.2% benzodiazepines.
- Single drugs used were mainly cannabis 61.6%, alcohol 41.4% and methamphetamines 38.4%.
- In the group taking cannabis 50% of them took cannabis seven days a week, 92% of them drove within three hours of taking cannabis and 60% drove daily.

- Over half said cannabis did not affect their driving. Nearly half of those who felt cannabis did affect them said it had a positive effect.
- A total of 35% of the face-to-face group took benzodiazepine not as a medical prescription. The main drug of choice was Valium (diazepam), a high half-life drug, with over half the group taking it.
- More than half the respondents taking benzodiazepine believed the drug affected their driving mainly in a negative way.
- Methamphetamine users tended to take the drug for seven days a week and/or until they ran out.
- A total of 98.1% of methamphetamine users said they drove daily after taking the drug and within a three-hour time frame.
- Methamphetamine users believed the drug affected their driving, most in a positive way (43% compared with 38% negative).
- Almost the entire sample had been passengers with drug/drink drivers.
- Most drug users perceived they were good drivers and considered themselves safety conscious.
- Just over half considered themselves law abiding.
- They enjoyed taking risks and most did take risks driving.
- Main effects on driving noted for all drugs were 'it changes my mood' and 'it changes my reaction time'.
- A total of 79% had been involved in at least one crash and of these 57% reported that they were at fault.
- A total of 80% had a previous driving conviction.
- A total of 29% of the face-to-face group drove but did not have any form of driver licence, 31 % had a full licence, 39% drove on a learner or restricted licence.

7.1.3 Summary of countermeasures

- The top three countermeasures considered by the general population to have the most impact on drug-driving were, 'vehicle impoundment', 'randomised on-road testing', and 'on-road enforcement'.
- The top three deterrents considered effective by the face-to-face group were, 'randomised on-road testing', 'vehicle impoundment' and 'fear of getting caught'.
- The lowest rated deterrents for the face-to-face group were 'friend and family finding out', 'publication of your name' and 'driver education'.
- Social media as a deterrent was not rated highly by either group. But it was rated higher by the general population (54%) than the face-to-face group (29%).
- Social media may be important for raising general awareness of the drug-driving issue in the general population and to support other measures rather than an end in itself.

7.2 Recommendations

The following recommendations are based on the information gathered from the sample population. It was envisaged that these would give some guidance as to what measures would influence New Zealand

drivers. They might be refined, based on the findings and developments from Europe, the UK, Australia, Canada and the USA.

- Further in-depth research is recommended into the driving ability and competence of drug users by means of questionnaire studies to better assess impairment and risk when driving and using drugs.
- Development of programmes to reduce the risks for the drug user group to themselves and to other drivers on the road, when they drive or consider driving under the influence of drugs or alcohol should be considered.
- Based on the findings of international research and practice, consideration should be given in the future to developing randomised on-road testing for drug use in New Zealand.
- In order to change behaviour in the drug user group, more enforcement and penalties such as vehicle impoundment should be considered.
- Given that the findings of this study are fairly consistent with the findings of similar studies in other countries, it may be productive to use countermeasures that have been tested internationally.
- Further research on the associated risk and driver behaviour of people taking a combination of prescription drugs would assist in influencing future transport policies and road safety campaigns.

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