Cannabis in Australia

Use, supply, harms, and responses

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EXECUTIVE SUMMARY

This monograph was written to provide an overview of the cannabis situation in Australia at the present time, including patterns of use, supply, harms and legislation. It helps set the context for the *National Cannabis Strategy 2006-2009*, which was endorsed by the Ministerial Council on Drug Strategy on 15 May 2006. The strategy can be ordered through the National Drug Strategy web site: www.nationaldrugstrategy.gov.au. It should be noted that this monograph does not constitute part of the Strategy.

Cannabis use

Cannabis the plant, potency, routes of administration, and effects

The cannabis plant contains over 60 cannabinoids, which provide the psychoactive, or mind-altering effect of cannabis. The strength of the effect of cannabis (its potency) varies according to the way the plant is grown, the way it is prepared and the part of the plant that is used. Although the cannabis that is used today may be slightly more potent than what was used 30 years ago, there is no evidence to suggest that cannabis potency has increased markedly, as has been suggested by some commentators. The increase in cannabis-related problems noted over the last few years is likely to be due to earlier age of initiation into cannabis use and the use of more potent parts of the plants (i.e. the buds or heads, rather than the leaves), rather than because of an increase in potency.

Cannabis can be prepared by drying the leaves and buds of the plant ('marijuana'), or extracting the resin ('hash' or 'hashish'). Cannabis can be eaten or smoked. In Australia, marijuana is used more commonly than hash, and is usually smoked. Cannabis exerts its psychoactive effect via endogenous cannabinoid receptors in the brain, which are distributed in areas that affect the control of movement, appetite, emotion and cognitive functioning. Subjectively, cannabis intoxication can lead to relaxation, enhanced sensory experiences, increased sociability and mirth, and a distorted perception of time. Cannabis intoxication can also have undesirable effects such as anxiety, panic, paranoia and apathy.

Cannabis dependence

The majority of people who try cannabis will use it sporadically during adolescence and early adulthood and cease use once the late 20s is reached. However, there is a proportion of people that will use cannabis for longer and more often, and become dependent on the drug. Cannabis dependence is characterised by: psychological symptoms, such as having a great desire to use cannabis, using regularly and often daily, and an inability to cut down use; physiological signs, such as tolerance and withdrawal; and behavioural symptoms, such as using cannabis in inappropriate circumstances. In Australia, the past-year prevalence of cannabis dependence is 1.5%.

Current patterns of cannabis use in Australia

Cannabis was not used widely in Australia until the 1970s. From that time, use of cannabis has increased steadily, peaking in the late 1990s. Since 1998, cannabis use has fallen slightly but still remains the most widely used illicit drug in Australia. According to the most recent National Drug Strategy Household Survey, approximately one-third of Australians have tried cannabis, and about one in ten have used it in the past year. Cannabis use is most prevalent among those aged in their 20s, and is more commonly used by males than females. Of those who reported using cannabis in the past year, 16% use it every day, but over half only use it less than monthly.

In terms of comparison of cannabis use with other countries, past year prevalence in Australia is similar to the United States of America and the United Kingdom (11%). Canada and New Zealand have slightly higher annual prevalence rates (14% and 20% respectively). Elsewhere in the world, the annual prevalence of cannabis use is generally under 10%. It should be noted that comparisons between countries need to be treated with caution, given the differing methodology and timing applied to the surveys in each of these countries, and it is unknown whether the differences stated here between countries are of statistical significance.

The average age of initiation into cannabis use is approximately 19 years old, but there is evidence to suggest that this age of initiation is getting younger over time. Early initiation into cannabis use is associated with a greater likelihood of developing dependence and suffering from cannabis-related problems. According to school student surveys, approximately one-quarter of students aged 12 to 17 years have tried cannabis and one in five have used it in the past year.

Cannabis use among Aboriginal and Torres Strait Islander peoples is greater than among the general population, with 50% and 27% of Aboriginal and Torres Strait Islander peoples reporting lifetime and past year use of cannabis respectively in 2001. Research suggests that cannabis use has increased strikingly in recent years among Aboriginal and Torres Strait Islander peoples living in remote communities.

Cannabis use is higher among those who are regular users of other illicit drugs than among the general population. Also, use is higher among those who have come into contact with the criminal justice system (police detainees or offenders).

Although most cannabis users will not go on to use other illicit drugs such as amphetamines or heroin, most users of these other drugs used cannabis first. There is evidence that cannabis use predicts later use of other drugs, but the mechanism via which this occurs remains unclear. It could be that those who use cannabis are more likely to be exposed to opportunities to buy other illicit drugs, or that the use of cannabis leads to neurological changes that increase the desire to use other drugs. Both these explanations suggest that cannabis acts as a 'gateway' to other drug use. The alternative explanation is that there are common factors that underpin the use of cannabis and the use of other illicit drugs. It should be noted that recent research has suggested that cannabis may act as a 'gateway' to nicotine dependence, given the common practice of mixing tobacco in with cannabis when it is smoked. Tobacco is often mixed with cannabis to assist with burning, and thereby can indirectly expose the cannabis user to nicotine.

Factors affecting cannabis use and the social determinants of drug use

The causes of substance use, including cannabis, are broad and complex. Each individual has a combination of risk and protective factors that influence whether they will go on to develop a problem as a result of cannabis use. Some of the risk factors across the life course for the development of cannabis use are: genetic predisposition, drug use in pregnancy, early behavioural and emotional problems, and exposure to drugs during adolescence. These risk factors are compounded by low socio-economic status, poor parenting and cognitive problems. Societal norms with respect to drug use, government social policies, and housing issues such as proximity to drug markets also have an effect on the risk of cannabis use.

Cannabis supply

Availability

According to the most recent household survey, about one in five Australians stated they had the opportunity to use cannabis in the previous 12 months. Among populations of drug users, cannabis is 'easy' or 'very easy' to obtain.

Price

In Australia, one gram of cannabis generally costs about $25. An ounce (28 grams) ranges from $150 to $400. Hydroponically-grown cannabis is more expensive than naturally-grown cannabis, particularly when it is bought in bulk.

Seizures and arrests

Most cannabis that is seized in Australia is grown domestically rather than imported. There are comparatively more detections of hydroponic plantations in residences than there are large crops of naturally-grown cannabis, although both methods are common. Although more plants can be grown outdoors, hydroponic plants can be grown year-round and provide a greater yield of cannabis per plant than cannabis plants grown outdoors.

The number of cannabis seizures has remained relatively stable over the past few years but the weight of seizures has fluctuated. Arrests have also remained stable, with approximately 55,000 cannabis-related arrests recorded during 2004-05. Most of these arrests were for use or possession, rather than supply, of cannabis.

Cannabis harms

There have been no deaths recorded as a result of cannabis intoxication. However, there is growing evidence that cannabis use has the potential to have adverse physical, psychological and social outcomes.

Respiratory problems and cancer risk

There is evidence that long-term cannabis smokers are more likely to suffer from respiratory problems such as chronic cough, sputum production, wheezing and bronchitis than non-users, even after controlling for tobacco use. There is mixed evidence for the relationship between cannabis smoking and cancer. Cannabis smoke contains carcinogens and it has been found that more tar is inhaled and retained when cannabis is smoked than when tobacco is smoked. However, epidemiological or case-control studies have not yielded sufficient evidence to conclude that cannabis causes cancer, and further research of this type is needed.

Cardiovascular effects

Cannabis increases the heart rate, and has been associated with adverse cardiovascular events such as stroke and heart attack. However, these health complications seem to be rare, and cannabis smoking does not generally cause problems for those who have healthy cardiovascular systems. Cannabis smoking may be a risk factor for adverse outcomes for those who have existing cardiovascular problems.

Reproductive effects

Animal research suggests that THC exposure leads to abnormalities in reproductive functioning, birth defects, and low birth weight. However, the research assessing the effects of cannabis on human reproduction is not as clear. This is mainly due to the difficulties in assessing this relationship in humans because of under-reporting of drug use during pregnancy, and the confounding effects of tobacco and alcohol use, which are likely to operate in women who use cannabis during pregnancy. However, there are a few studies that have controlled for possible confounders and these have generally found that cannabis use causes decreases in birth weight.

Immunological effects

The issue of whether cannabis has an adverse effect on the immune system is significant, given the therapeutic use of cannabis in those suffering from diseases affecting the immune system, such as cancer or HIV/AIDS. Much like the literature on the reproductive effects of cannabis, the literature on the immunological effects is inconclusive. An adverse effect of cannabis on immunity is found in animal and laboratory studies, but the research on humans is conflicting and too limited to draw any conclusions.

Cannabis and driving

The acute effects of cannabis can adversely affect driving ability and increase the risk of accident. Laboratory studies have shown that even low doses of THC compromise reaction time, attention, decision making, time and distance perception, short-term memory, hand-eye coordination, and concentration. Overall, most (but not all) driving simulator studies, field studies of accidents, and self-report studies have shown that cannabis has an adverse effect on driving. However, it is often difficult to determine the effect of cannabis in isolation of other factors that contribute to accident risk. There is some evidence to suggest that cannabis and alcohol have an

additive deleterious effect on driving. Overall, although the literature on cannabis and driving is not entirely clear, there is enough evidence to suggest that driving under the influence of cannabis is associated with motor vehicle accident risk and is something that should be prevented. Surveys also show that driving while under the influence of cannabis is sufficiently prevalent to warrant concern.

Effect of cannabis on cognitive functioning

There is not much debate about whether the acute effects of cannabis influence cognitive functioning in the short-term. Cannabis impairs a number of cognitive abilities during the period of intoxication in a dose-dependent manner, including attention, reaction time, short-term memory, time perception, and higher cognitive functioning such as mental arithmetic. This effect is a concern in the context of impaired driving ability and performance at school or in the workplace. However, perhaps of greater concern is the suggestion that cannabis use causes chronic, perhaps irreversible, cognitive impairment. Studies show that long-term cannabis use has a deleterious effect on cognitive functioning, but this effect does not appear to continue once cannabis use is stopped for a certain period of time, although subtle cognitive deficits may persist.

Cannabis and psychosis

Cannabis use has been associated with symptoms of psychosis, which refers to a set of signs and symptoms that mean the sufferer cannot distinguish reality from fiction. It is most commonly associated with the mental disorder schizophrenia, but psychosis is a feature of many different mental disorders, and psychotic symptoms can be experienced without developing into a full mental disorder. Cannabis users are more likely to suffer from psychosis than those who do not use cannabis. Moreover, those who suffer from psychosis are more likely to use cannabis than those who do not suffer from psychosis, and cannabis use has been found to make psychotic symptoms worse. There is ongoing debate about the nature of this association, with some arguing that cannabis causes psychosis and schizophrenia. The association is stronger for heavier users of cannabis, those who began using cannabis earlier, and those with a predisposition (or vulnerability) to psychosis. In recent years there have been a number of prospective studies showing that cannabis use predicts later psychotic disorders or psychotic symptoms, even after confounding factors, such as other drug use, are controlled for. The association is biologically plausible, given the involvement of the dopamine system and common brain structures in both cannabis intoxication and psychosis. Overall, there is growing consensus that cannabis use represents a statistical risk factor for developing later psychosis, in particular for those with a vulnerability for developing a psychotic disorder. It should be kept in mind that the vast majority of those who use cannabis do not go on to suffer from a psychotic disorder, and that the prevalence of schizophrenia has not changed during periods when cannabis use has increased among the population.

Cannabis and other psychiatric disorders

The association between cannabis use and other psychiatric disorders such as depression and anxiety is not as well-researched as that between cannabis use and psychosis, despite the fact that anxiety and depression are much more prevalent.

The studies that have been conducted show that regular cannabis use is associated with elevated symptoms of depression, and early cannabis use may predict the development of a later depressive disorder. The relationship between cannabis use and anxiety disorders is not so clear. While cannabis use is associated with concurrent symptoms of anxiety, there is not much evidence to suggest that cannabis use predicts the later development of anxiety disorders.

Cannabis and motivation

It has been proposed that cannabis use causes low motivation, with some arguing for the existence of a specific 'amotivational syndrome' associated with cannabis use, characterised by apathy, low productivity, lethargy, poor attention and concentration, and difficulty in carrying out long-term plans. Despite clinical and anecdotal support for a cannabis-related amotivational syndrome, there is little field or laboratory evidence to back this up. This is in part due to the complexity involved in measuring motivation, and distinguishing low motivation from co-existing symptoms of depression, which are common among regular cannabis users.

Cannabis and educational and occupational performance

There is evidence that cannabis use leads to poor educational outcomes, probably due to the association between early cannabis use and other behaviours that adversely affect educational outcomes, and the effect of regular cannabis use on cognitive performance. The relationship between cannabis use and job performance is not straightforward. Research assessing this link is difficult to summarise given the different methodologies applied and the differences in the way job performance is measured. Most studies show that cannabis adversely affects job performance in some way, but it cannot be concluded that cannabis directly *causes* poor occupational outcomes, and more research is needed.

Cannabis and financial and interpersonal problems

Financial problems are reported as one of the negative effects of cannabis dependence, due to significant proportions of a cannabis-dependent person's income being spent on cannabis. Although the financial burden of cannabis dependence is not as great as for more expensive illicit drugs such as heroin, for some people it still has the potential to have an adverse effect on their daily lives.

Interpersonal relationship problems are also identified by cannabis users as an adverse outcome of cannabis dependence. Poor family relationships are often a precursor to harmful substance use, including cannabis use.

Cannabis and crime

Cannabis use, like the use of other illicit substances, is associated with crime. Cannabis users are more likely to engage in criminal behaviour than the general population and rates of cannabis use are higher among criminal offenders than among those who do not commit crime. Research suggests that this relationship can be explained by personality characteristics and environmental factors leading to both cannabis use and criminal involvement. It should be noted that most cannabis

users do not commit other crimes. One of the social harms of cannabis use is the risk that individuals will become involved in the criminal justice system (for example, if they are caught with a small amount of cannabis) when they would not have done so otherwise. Obviously, given the illicit nature of cannabis and the extent of its use in Australia, there is a large black market that supplies cannabis. This illegal market represents a substantial amount of lost revenue for the state, given that no tax is collected. Police officers report broader community harms associated with the illicit cannabis trade, such as fires and property damage as a result of rental properties being used to cultivate hydroponic cannabis, electricity theft, violence and other criminal activity.

Groups at risk of cannabis harms

The groups generally thought to be at greatest risk of suffering from problems associated with cannabis use are: young people (due to the decreasing age of initiation of cannabis use among young people and the association between early initiation into substance use and subsequent problems such as dependence, and the risks associated with using cannabis at a developmentally vulnerable age); Aboriginal and Torres Strait Islander peoples (due to high rates of use coupled with long-standing risk factors for poor health and social well-being); and people with mental health problems (due to the risk of cannabis exacerbating existing mental health issues).

Treatment for cannabis dependence

Demand for treatment for cannabis dependence has increased in Australia over the last 15 years. Two major types of psychological treatment for cannabis dependence – cognitive-behavioural therapy and motivational enhancement therapy – have been found to be more effective than no treatment in decreasing cannabis use and encouraging abstinence. Brief intervention sessions have also been found to be effective in reducing cannabis use. More research is needed to determine the efficacy of pharmacotherapies for coping with cannabis withdrawal and for preventing relapse.

The cost of cannabis use

The cost of drug and alcohol use in Australia during 1998/1999 was over $34 billion, but the majority of this cost is from alcohol and tobacco. According to the most recent Australian Burden of Disease and Injury study, in 1996, cannabis was estimated to account for the loss of 4,416 health years of life in 1996. This represents 0.2% of the burden of disease in Australia (illicit drugs together accounted for 2%). Although cannabis is associated with harm, which needs to be addressed, it represents a less serious cost to society, from a public health perspective, than the licit drugs alcohol and tobacco (Hall and Pacula, 2003). It should be noted that at the individual community level, the economic cost of cannabis use can be substantial, depending on the level of use and existing community resources.

Responses

National drug strategies in Australia

National drug policy in Australia has been based on the principle of harm minimisation since the initiation of the National Campaign against Drug Abuse in 1985. This principle is put into practice using three different approaches: strategies that reduce the supply of drugs, strategies that reduce the demand for, and uptake of, drug use, and strategies that aim to reduce drug-related harm on an individual and community level. The current *National Drug Strategy 2004-2009* has as its mission: "To improve health, social and economic outcomes by preventing the uptake of harmful drug use and reducing the effects of licit and illicit drugs in Australian society." Substance-specific strategies have been developed under the framework of the *National Drug Strategy*, including the *National Tobacco Strategy 2004-2009*, the *National Alcohol Strategy 2006-2009*, and Australia's first *National Cannabis Strategy 2006-2009*.

Cannabis legislation and policy in Australia

Importation and exportation of cannabis across the Australian border is illegal, and federal offences apply to those caught carrying out this activity. There are also new federal offences targeting commercial cultivation of cannabis, domestic trafficking of cannabis, and possession of cannabis. However, most cannabis offences committed are domestic offences that are dealt with under state and territory legislation. States and territories differ from each other when it comes to cannabis legislation, although it must be highlighted that any activity related to cannabis is illegal across Australia. The differences are particularly marked when it comes to penalties for 'minor cannabis offences', such as the possession of a small amount of marijuana, or the possession of cannabis smoking equipment. In South Australia, the Northern Territory, the Australian Capital Territory and Western Australia, a minor cannabis offence may be dealt with by issuing a small fine (analogous to a speeding ticket) rather than charging the offender with a criminal offence. However, a criminal charge may be laid if the fine is not paid within a specified period of time. New South Wales, Queensland, Victoria and Tasmania may charge minor cannabis offenders with a criminal offence, and this may lead to incarceration or large fines. However, all these states have diversion programs in place, which allow police to divert minor cannabis offenders away from the criminal justice system (i.e. refrain from charging them with a criminal offence) and into drug education, assessment, and/or treatment.

Cannabis policy and legislation elsewhere

Like Australia, other countries including New Zealand, Canada, the UK and Portugal use the principle of harm minimisation as the basis for their drug policy, which acknowledges that drug use will occur. In contrast, Sweden aims for a drug-free society, and has coerced treatment for drug users. The USA has a zero tolerance approach to cannabis federally. In New Zealand and Canada, minor cannabis offences have not been decriminalised (meaning that the offence is still illegal, but does not attract a *criminal* charge) as has happened in certain states and territories in Australia. Despite the tough stance taken on cannabis at the federal level in the USA, cannabis has been decriminalised in certain states. Portugal has decriminalised

minor offences involving not only cannabis, but all illicit substances. The Netherlands has, in practice, legalised the use and sale of small amounts of cannabis. Canada and the Netherlands allow for the medicinal use of cannabis. Federally, the USA does not allow for medicinal use of cannabis, but some states have gone against this by introducing legislation for medicinal cannabis. When it comes to cannabis legislation, of the countries reviewed in this section, Australia seems to sit somewhere in the middle alongside New Zealand and the UK, with the restrictive Swedish and Federal USA Governments on one side, and the more liberal Netherlands, Portuguese, and Canadian Governments on the other.

INTRODUCTION

Evidence suggests that cannabis-related problems are on the rise (Australian Institute of Health and Welfare, 2005d; Australian Institute of Health and Welfare, 2006), and cannabis remains by far the most widely-used illicit drug in Australia today (Australian Institute of Health and Welfare, 2005a). The peak body responsible for drug-related policy and decision making in Australia, the Ministerial Council on Drug Strategy (MCDS), decided at the end of 2004 that a national strategy should be developed to address the harms associated with cannabis. This strategy was developed during 2005 by a Project Management Group led by Professor Richard P. Mattick of the National Drug and Alcohol Research Centre. In May 2006, the *National Cannabis Strategy 2006-2009* was endorsed by the MCDS. It represents Australia's first national strategy dealing specifically with cannabis.

This monograph, *Cannabis in Australia: Use, supply, harms and responses*, examines the current situation with respect to cannabis in Australia. Although not part of the *National Cannabis Strategy 2006-2009*, it helps set the context for this strategy, which sets out to minimise cannabis-related harm through supply, demand and harm reduction strategies. This monograph provides an overview of the current cannabis situation in Australia, including the prevalence and patterns of use, supply, adverse effects of use, and cost. Also included is an outline of current cannabis policy and legislation in Australia and elsewhere.

CANNABIS USE

Cannabis: A description of the drug

The psychoactive drug cannabis or marijuana comes from the plant of the genus *cannabis*. There are three ways that cannabis is prepared for administration. Most commonly, the flowering tops (buds) or leaves of the plant are dried to prepare 'marijuana', or the resin secreted from the plant is dried to prepare 'hashish' or 'hash'. Less commonly, 'hash oil' is prepared by extracting the psychoactive (i.e. mind altering) component of the plant in oil form (Hall et al., 2001). Throughout this monograph, the term 'cannabis' will be used as a general term, and 'marijuana', 'hash' and 'hash oil' will be used to refer to these particular preparations when specification is necessary.

Cannabis the plant

The cannabis plant contains over 60 cannabinoids, which are the compounds that provide the psychoactive effect of the drug (Nahas, 1992; Ashton, 2001). The cannabinoid with the strongest psychoactive effect is delta-9-tetrahydrocannabinol (THC). The amount of THC found in cannabis varies according to three main factors (Ashton, 2001). Firstly, the way the plant is cultivated can alter the THC content of the plant. High levels of THC are found when female cannabis plants are grown in isolation so they do not become pollinated by male plants. The unfertilised flowering tops of plants cultivated in this way are called 'sinsemilla' (World Health Organization, 1997). Cannabis that is grown hydroponically, which refers to the process of growing the plants indoors under artificial light with nutrient baths, is thought by some to have higher concentrations of THC than cannabis that is grown naturally (Adams and Martin, 1996; Poulsen and Sutherland, 2000); however, there is some controversy over this assertion, which has not been tested scientifically in Australia. Cross-breeding and genetic modification have produced strains of the *cannabis sativa* plant with increased levels of THC (Adams and Martin, 1996; Hall and Swift, 2000).

The second factor that affects THC level is the part of the plant that is used. The flowering tops contain the highest concentration of THC, followed by the leaves (Adams and Martin, 1996). Lower THC concentrations exist in the stalks and seeds (Hall et al., 2001). The third factor influencing the level of THC is the way cannabis is prepared for administration. Hash oil is the most potent preparation, with concentration levels of THC ranging from 15% to 30%. The compressed cannabis resin, or hash, has the next-highest level of THC concentration, varying between 10% and 20%. Marijuana has the lowest concentration of THC, ranging from 0.5% to 20%, depending on the type and location of cultivation (Ashton, 2001; Hall et al., 2001).

Potency

It has been claimed that the potency of cannabis has increased over the last two decades (Solowij, 1999; El Sohly et al., 2000; Ashton, 2001), with some, particularly those in the popular media, suggesting that the marijuana used in Australia and

elsewhere today is 30 times stronger than that used in the 1970s (see Hall and Swift, 2000). There is some evidence for an increase in the potency of cannabis in the United States of America (USA), where the THC concentration of confiscated marijuana rose from 1.2% in 1980 to 4.2% in 1997 (El Sohly et al., 2000). Analysis of cannabis seized in New Zealand between 1976 and 1996 did not show an increase in potency (Poulsen and Sutherland, 2000). The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) recently commissioned a report investigating the potency of cannabis in Europe, which concluded that the potency of cannabis used in Europe has not increased significantly over time, with the exception of the Netherlands, where most of the cannabis is now produced domestically using hydroponic methods. It is difficult to determine whether the potency of cannabis in Australia has increased, due to a lack of data (Hall and Swift, 2000). Although there is currently no legal imperative to test the potency of cannabis in Australia, it is important due to suggestions that stronger cannabis leads to more adverse health effects (Hall and Swift, 2000).

The EMCDDA report points out that the potency increase seen in cannabis in the USA may actually represent a change from very low-potency cannabis used in the 1970s to cannabis that is comparable to what has always been available in Europe, rather than a move towards unusually potent cannabis (European Monitoring Centre for Drugs and Drug Addiction, 2004a). Other researchers have argued that the potency of cannabis analysed in the USA in the 1970s was underestimated because the samples were not stored properly and were allowed to degrade (e.g. Mikuriya and Aldrich, 1988). There has not been sufficient systematic monitoring of cannabis potency to make any definitive conclusions about whether the cannabis used today is more potent than has been used in the past. What is clear from the fragmented research on trends in cannabis potency is that there is no evidence for the 30-fold increase that has been claimed by some (Hall and Swift, 2000; Poulsen and Sutherland, 2000).

In Australia, there is evidence that cannabis-related health problems have increased over the past two decades (see Hall and Swift, 2000 for a review), which is used to support the argument that cannabis has become more potent due to a rise in the cultivation of more potent subspecies (Solowij, 1999; Ashton, 2001). An alternative explanation for the increase in cannabis problems is that, over time, the more potent parts of the plant, such as the flowering tops, are being used more commonly than the less potent parts, such as the leaves. Australian survey data suggests that the latter explanation is more plausible for the increase in cannabis-related problems than an increase in the potency of cannabis plants on the market in Australia (Hall and Swift, 2000). Another likely explanation is that the age of initiation of cannabis use has become younger over time. Earlier age of initiation is associated with an increased likelihood of dependence, which is in turn associated with an increased chance of experiencing cannabis-related problems (Degenhardt et al., 2000b; Hall and Swift, 2000).

Routes of administration

Marijuana can be smoked in a water pipe, known as a 'bong', or as a cigarette, known as a 'joint'. Hash and hash oil can be added to a cigarette or smoked in a pipe. Marijuana, hash and hash oil can also be added to food or drink and ingested orally

(Hall et al., 2001). According to the 2004 National Drug Strategy Household Survey, smoking the flowering tops, or 'head' of the cannabis plant in a joint, bong or pipe is the most common way to ingest cannabis in Australia. Over three-quarters (76%) of recent cannabis users surveyed stated that they used cannabis heads and 44% stated that they used cannabis leaf. Less than one in five cannabis users reported using cannabis resin (including hash), and only 5% reported the use of cannabis oil (Australian Institute of Health and Welfare, 2005b). In 1998, less than one per cent of recent cannabis users reported that they usually ingested cannabis orally (Adhikari and Summerill, 2000).

Cannabis metabolism and acute psychoactive effects

Smoking cannabis is an effective method for THC to quickly reach the brain and exert the desired psychoactive effects (Castle and Solowij, 2004). This may explain why smoking is by far the most popular way in which to use cannabis in Australia (Adhikari and Summerill, 2000). When smoked, about half of the THC is inhaled and most of what is inhaled enters the bloodstream via the lungs (Ashton, 2001). Once in the bloodstream, THC travels to the brain very quickly. The psychoactive effects of cannabis begin within minutes of smoking, and peak within half an hour (Martin and Cone, 1999). When swallowed, cannabis causes similar psychoactive effects but takes longer to reach the bloodstream than when smoked, so that the onset of the effect is delayed by between one and three hours (Martin and Cone, 1999; Ashton, 2001). This delay in psychoactive effect can result in people ingesting more cannabis than desired.

Once metabolised by the liver, THC and its metabolites are distributed to other parts of the body and accumulate in fatty tissue, due to their fat-soluble nature. Once cannabinoids are stored in fatty tissue, they are released slowly back into the bloodstream, leading to potential detection in the blood and urine for days and possibly even weeks (Nahas, 1992; Ashton, 2001; Hall et al., 2001). Although THC and its metabolites are released into the blood for days following the administration of the drug, there is little evidence that this causes intoxication to re-occur without re-administering the drug (see Hall et al., 2001).

Once THC and other cannabinoids reach the brain, they bind to endogenous (naturally-occurring) cannabinoid receptors known as CB_1 receptors, which were discovered in the late 1980s (Devane et al., 1988). Another type of cannabinoid receptor, the CB_2 receptor, has been identified, but this type is a peripheral receptor, and thus is not found in the brain (Joy et al., 1999). Just as the human brain produces endogenous opioids to interact with the endogenous opioid receptors, naturally-occurring cannabinoids interact with CB_1 and CB_2 receptors (Devane et al., 1992). The CB_1 receptors are found in the frontal regions of the cerebral cortex, basal ganglia, cerebellum, and limbic structures such as the amygdala, hypothalamus and hippocampus (Howlett et al., 2004). These areas are involved in the control of movement, appetite, emotion, memory and cognitive functioning.

The locations of the cannabinoid receptors are consistent with some of the psychomotor and psychoactive effects of cannabis on humans. In a recent review, Iverson (2003) outlines four main types of cannabis effects in relation to the distribution of the cannabinoid receptors in the brain. Firstly, cannabis affects

the control of movement. Experimental research has shown that balance and fine psychomotor performance are adversely affected by cannabis administration. This could be explained by the density of cannabinoid receptors in the basal ganglia and cerebellum. Secondly, cannabis impairs short-term memory, which is probably due to the existence of cannabinoid receptors in the hippocampus. Thirdly, cannabis can affect various aspects of cognitive function, in particular producing lack of inhibition of responses, compromised alertness and attention, poor performance on tasks involving complex mental arithmetic, and poor performance on complex reaction time tasks. These effects could be related to the existence of cannabinoid receptors in the neocortex. Fourthly, anecdotal reports as well as animal and human experimental research have shown that cannabis can stimulate the appetite. This is consistent with the fact that cannabinoid receptors are also located in the hypothalamus, a structure in the brain that is involved in the regulation of appetite.

It is the appetite-stimulating property of cannabis that lends itself to medicinal use in the context of wasting diseases such as AIDS. Cannabis has also been shown to have analgesic properties, which is perhaps unsurprising given the number of cannabinoid receptors found at different points along the body's pain pathways (Iverson, 2003).

Iverson (2003) provides a description of the experience of being intoxicated with cannabis, based on subjective reports of users:

"A typical 'high' is preceded initially by a transient stage of tingling sensations felt in the body and head accompanied by a feeling of dizziness or light headedness. The 'high' is a complex experience, characterised by a quickening of mental associations and a sharpened sense of humour, sometimes described as a state of 'fatuous euphoria'. The user feels relaxed and calm, in a dreamlike state disconnected from the real world. The intoxicated subject often has difficulty in carrying on coherent conversation, and may drift into daydreams and fantasies. Drowsiness and sleep may eventually ensue." (Iverson, 2003, p. 1261)

Other potentially desirable effects of intoxication (from a user's perspective) include perceptual alterations, enhanced sensory experiences, increased talkativeness, sociability and mirth, and a distorted perception of time (Hall et al., 2001; Castle and Solowij, 2004). In addition, there are undesirable effects of cannabis intoxication, most often experienced by naïve users or experienced users who use particularly high doses (Hall et al., 2001). These negative effects include short-lived feelings of anxiety, panic, depression, apathy and paranoia. More uncommon adverse effects include psychotic symptoms such as persecutory delusions and auditory or visual hallucinations, although these are usually only experienced after the administration of extremely high doses of cannabis (Hall et al., 2001; Castle and Solowij, 2004). The link between cannabis and mental disorders such as psychosis is discussed later in this monograph ('Cannabis harms').

Physiologically, cannabis causes increased heart rate and changes in blood pressure such that blood pressure increases while the intoxicated individual is sitting, but decreases while the individual is standing (Hall and Pacula, 2003). Other physical effects of cannabis intoxication include dry mouth, reddening of eyes, an increased need to urinate, and tingling in the lips, fingers and toes (Castle and Solowij, 2004). The administration of very high doses of THC to small animals can cause death by

cardio-pulmonary arrest. However, there is no record of cannabis causing death in humans by overdose. The amount of THC that would need to be administered to humans to cause death is prohibitively large (Hall and Pacula, 2003).

The acute psychoactive effects of cannabis can in turn be associated with adverse outcomes, such as psychomotor effects inhibiting the ability to drive a vehicle competently. Further discussion of acute and chronic adverse effects of cannabis appears further on in this monograph ('Cannabis harms').

Cannabis dependence

Typically, people who use cannabis do not progress to using the drug regularly for the long-term. Most will experiment sporadically with cannabis during adolescence and early adulthood and cease use once reaching their mid- to late-20s (e.g. Chen and Kandel, 1995). However, there is a proportion that will use cannabis for longer and more often, and become dependent on the drug. Hall and Pacula (2003) suggest that the risk of dependence among those who have ever used cannabis is one in ten. For those that have used several times, the risk is approximately one in five, and for daily cannabis users the risk of becoming dependent on cannabis is one in two. Those who are dependent on cannabis are at a greater risk of experiencing the harms associated with cannabis use. Studies have shown that dependent cannabis users report the following problems which they associate with dependence: cognitive and motivational problems, interpersonal relationship problems, memory problems, and financial difficulties (Budney and Moore, 2002).

In the past, the syndrome of cannabis dependence has not been as well recognised as opioid dependence, which is characterised by tolerance and withdrawal symptoms (Swift et al., 1999). The discovery of the endogenous cannabinoid system, and the development of the cannabinoid antagonist (a chemical that blocks the effect of cannabinoids) SR141617A, led to animal research that clearly showed cannabis withdrawal in animals (Budney and Hughes, 2006). Additionally, surveys of cannabis users (e.g. Swift et al., 2000) as well as laboratory studies (e.g. Georgotas and Zeidenberg, 1979) have shown that cannabis tolerance (i.e. requiring increasingly greater amounts of a drug to obtain the desired psychoactive effect) and withdrawal exists in humans and can form part of a cannabis dependence syndrome. Cannabis withdrawal includes the following signs and symptoms: decrease in appetite, sleeplessness, irritability, stomach pain, depressed mood, anger/aggression, and restlessness (Budney and Moore, 2002).

The nature of cannabis dependence, which includes (but is not limited to) tolerance and withdrawal, has been elucidated and is now reflected in the major diagnostic instruments such as the most recent Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), and the International Classification of Diseases (ICD-10). Cannabis dependence is characterised by: psychological symptoms, such as having a great desire to use cannabis; physiological signs, such as tolerance and withdrawal; and behavioural symptoms, such as using cannabis in inappropriate circumstances (Babor, 2006). It is thought that dependence is: "a complex neurobiological phenomenon that results from social reinforcement of the initiation of substance use, neurochemical reinforcement of substance-taking behaviour and cognitive mediation of substance-related cues that are interpreted as 'cravings'" (Babor, 2006, p. 22).

According to the DSM-IV, which is a classification system of mental disorders, there are two cannabis use disorders: cannabis abuse, which is characterised by problems directly consequential to periods of cannabis intoxication (e.g. legal problems, injury, interpersonal problems, poor school performance); and cannabis dependence, which allows for the existence of these problems as well as uncontrollable use and tolerance (American Psychiatric Association, 2000). For diagnosis of cannabis dependence, three or more of the following symptoms must be displayed in the previous year: tolerance; withdrawal; taking more cannabis than intended or using for a longer-than-intended period of time; desiring to stop or reduce cannabis use but being unable to do so; spending a lot of time obtaining or using cannabis, or recovering from its effects; giving up important activities because of cannabis use; or continuing cannabis use despite known harmful effects (American Psychiatric Association, 2000).

The other major classification system is the International Classification of Diseases, which was designed for use by general medical practitioners (World Health Organization, 1992). This system specifies that cannabis dependence syndrome is diagnosed if three or more of the following symptoms have been experienced at some time in the past 12 months: a compulsion or strong desire to use cannabis; difficulties in controlling cannabis use; withdrawal; tolerance; neglect of other interests because of obtaining or using cannabis, or recovering from its effects; or continuation of cannabis use in spite of obvious harmful effects of use (World Health Organization, 1992).

Based on the National Survey of Mental Health and Well-Being (NSMHWB), which interviewed a representative sample of the Australian population about their mental health, the past-year prevalence rate for DSM-IV cannabis dependence was 1.5%. Among those who use cannabis, 21% met criteria for dependence on the drug (Swift et al., 2001). These rates are higher than in the USA where past-year prevalence of cannabis dependence is 0.5% and prevalence of dependence among cannabis users is 6.5% (Teesson et al., 2006). A study assessing long-term users of cannabis in Sydney found that dependence among this group was (unsurprisingly) high; between 62% and 92% of participants met criteria for cannabis dependence depending on the criteria used (Swift et al., 2000).

Swift and colleagues (1999) analysed the correlates of cannabis dependence using the NSMHWB data and found the following factors to be associated with cannabis dependence: being male; younger age (those aged 18 to 24 were more likely to be dependent than people in older age groups); being unemployed; and being Australian-born. No relationship was found between level of education and cannabis dependence. There is some research suggesting that early subjective positive experiences of cannabis use predict later dependence (Fergusson et al., 2003b). Other predictors that have been identified are more frequent use of cannabis, early initiation into cannabis use, poor family relationships, deviant or rebellious behaviour, maladjustment, and personal distress (Hall and Pacula, 2003).

Comorbidity with other substance use and mental health disorders was also associated with dependence. For example, three-quarters of cannabis-dependent people smoked cigarettes compared to 22% of the 'non-users'[1] of cannabis (Swift

1 Note that 'non-user' refers to respondents who had used cannabis five time or less in the previous 12 months

et al., 1999). Cannabis-dependent respondents were more likely to have an alcohol use disorder (37%) and opioid, stimulant or sedative use disorder (18%) than non-users (5% had an alcohol use disorder and 0.5% had an opioid, stimulant or sedative use disorder). Cannabis-dependent individuals were 3.3 times more likely to have seen a mental health professional than those who were not dependent on cannabis. Those who met criteria for cannabis dependence were also more likely to have a depressive disorder or anxiety disorder (24%) than those who were not dependent on the drug (16%) or were non-users (9%), although these mental health disorders were not significantly associated with cannabis dependence once other variables, such as alcohol use, were controlled for (Swift et al., 1999).

The history of cannabis use in Australia

The use of cannabis began in Asia thousands of years ago (Grinspoon and Bakalar, 1993; McDonald et al., 1994; Joy et al., 1999). The use of the plant for its fibre to make textiles and rope was recorded in China during the second century BC, was widespread in Europe in the Middle Ages and among the American colonialists, and continues today. Cannabis was used for its psychoactive properties in India thousands of years ago, in Egypt since the 13th century, and in Europe from the 16th century (McDonald et al., 1994).

The value of cannabis as a medicine has long been known and utilised in Asia, the Middle East, South America and Africa (McDonald et al., 1994). By the 19th century the use of cannabis for medicinal purposes became popular among modern Western physicians (Grinspoon and Bakalar, 1993). However, towards the end of this century, the use of cannabis as a medicine declined in the West due to the inconsistency in dosage and effects, and the introduction of more reliable pain relievers such as aspirin, and more effective ones such as opiates and opioids, which could be injected (Grinspoon and Bakalar, 1993; McDonald et al., 1994).

Moves to prohibit the non-medicinal use of cannabis by Western powers occurred in the late 19th and early 20th centuries. In British-ruled Egypt in the 19th century, the suppression of cannabis use was attempted. In India, however, Britain was more reluctant to suppress cannabis use due to the revenue it received from the hemp trade in that country. In South Africa, the use of hemp by foreign workers was outlawed in 1870. In the USA, the use of cannabis by Mexican refugees was a catalyst for the prohibition of the drug, due to the Americans' fear of the supposed violence-inducing effects of cannabis on this ethnic minority (McDonald et al., 1994).

In 1925 the Geneva Convention on Opium and Other Drugs restricted the use of cannabis to medicinal and scientific purposes. The move to include cannabis along with morphine, cocaine and heroin in the convention was largely pushed through by the USA. Australia was a signatory to this convention, although by that time in Australia the drug was not commonly used, as a medicine or otherwise (Makkai and McAllister, 1997). Most drug-related laws that had been enacted by jurisdictions of Australia by this time were related to opium (McDonald et al., 1994). Due in part to pressure from the United Kingdom (UK), Australia began to implement local laws consistent with the Geneva Convention. In 1928 the state of Victoria enacted legislation that prohibited the use of cannabis, and other states followed suit slowly over the next three decades (McDonald et al., 1994; Makkai and McAllister, 1997).

Like other Western countries, it was not until the 1970s that the use of cannabis became widespread and perceived as a significant social problem in Australia. New drug control laws were enacted during this time, both at the state and federal level, and the penalties for drug offences became more severe (McDonald et al., 1994). Despite this, cannabis remains the most commonly used illicit drug in Australia today (Makkai and McAllister, 1997).

Standardised surveys assessing illicit drug use among the general population in Australia were not implemented until 1985 with the introduction of the National Campaign Against Drug Abuse. However, in a review of the data on cannabis use collected before that time, Donnelly and Hall (1994) concluded that the use of cannabis amongst Australians began to rise from the early 1970s and continued to increase during the 1980s. For example, in a survey conducted in 1973, 22% of those aged 20 to 29 years reported ever having used cannabis; this rose to 56% in 1985. School surveys also show a marked increase in cannabis use during the 1970s and 1980s. Although differences in the surveys and changes in willingness to admit to illicit drug use over time are likely to have contributed to the change in prevalence, Donnelly and Hall (1994) point out that the extent and consistency of the increase suggests that a real rise in cannabis use occurred despite methodological issues.

To summarise, although the use of cannabis has an extensive history globally, it is only in the last three decades that the drug has been used to any significant degree in Australia. The current patterns of cannabis use in Australia are therefore of relevance.

Current patterns of cannabis use in Australia and other countries

General population

The Australian Government has conducted household surveys to assess the level of licit and illicit drug use among the general population since the initiation of the National Campaign Against Drug Abuse in 1985 (Donnelly and Hall, 1994). To date, there have been eight such surveys. The most recent survey was conducted in 2004.

As with previous surveys, cannabis was by far the most commonly used illicit drug by Australians in 2004 (Australian Institute of Health and Welfare, 2005a). About one in three (34%) Australians over the age of 14 have tried cannabis at least once during their life, and one in ten (11%) have used cannabis recently (Australian Institute of Health and Welfare, 2005c).

Cannabis use varies with age and is most prevalent among Australians in their 20s and 30s. Over half (55%) of Australians aged between 20 and 39 years have used cannabis during their lives compared to 42% of those aged 40 to 49 years and 22% of those aged between 50 and 59. Over one-quarter (26%) of adolescents (aged 14 to 19 years) have used cannabis during their lives. Further detail on the use of the drug among school-aged adolescents in Australia is presented below ('Young people and adolescents').

The lower proportion of cannabis use among the older age groups compared with younger age groups is even more striking when recent use is assessed. Over one-quarter (26%) of Australians aged 20 to 29 years reported recent (past year) use compared to 16% of those aged 30 to 39, 9% of those aged 40 to 49 and 3% of

those aged 50 to 59 (Figure 1). As is the case with other illicit drugs, males have higher prevalence of use than females, both for lifetime use (37% of males and 30% of females) and recent use (14% of males and 8% of females). This sex difference is seen across all age groups except the 14 to 19 year olds, in which there is little difference between males and females in terms of lifetime and past year use (Figure 1).

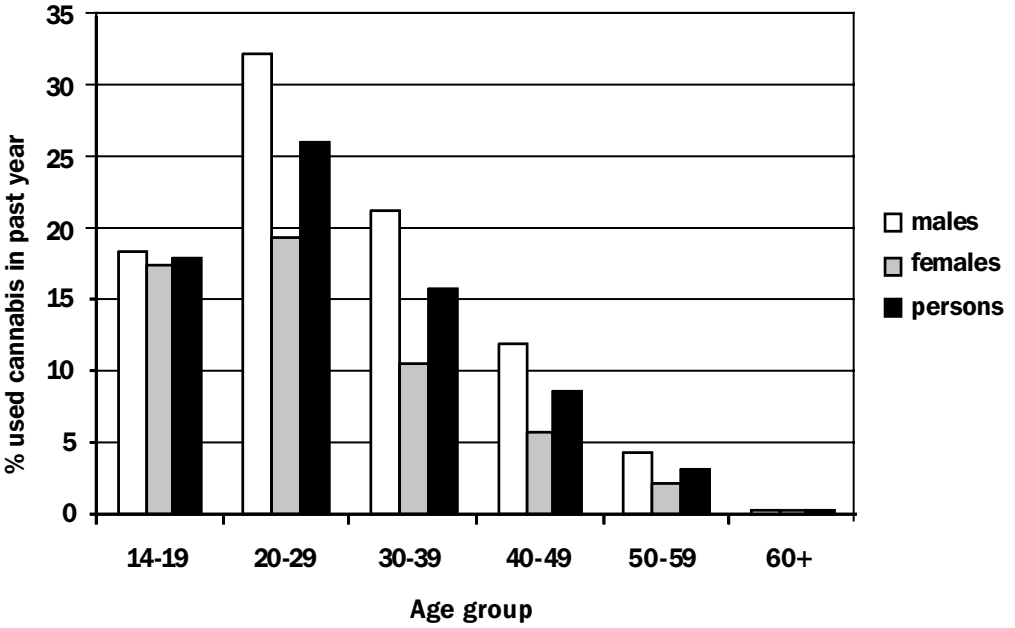

Figure 1. Proportion of Australians reporting recent use of cannabis, 2004
(Source: National Drug Strategy Household Survey)

Although the rates of cannabis use are considerable, most people who use cannabis do so infrequently (Hall, 2000). According to the 2004 household survey, approximately half of recent cannabis users used the drug less than once a month. However, the proportion of recent cannabis users who used cannabis every day (16%) is not trivial (Australian Institute of Health and Welfare, 2005e). Those aged 30 to 39 were more likely than other age groups to use cannabis every day (21% of recent cannabis users).

Just under one-third of recent cannabis users only smoked one joint or cone (the part of the bong that holds the cannabis) on a day they used cannabis (Australian Institute of Health and Welfare, 2005b). However, across all recent cannabis users, the average number of cones or joints smoked on any one day was 3.2.

As mentioned above, the prevalence of cannabis use in Australia increased throughout the 1970s and 1980s. The rise in use appears to have continued into the 1990s. The household survey conducted in 1998 recorded the highest prevalence of cannabis use (Figure 2), with 39% of those surveyed reporting lifetime cannabis use and 18% reporting cannabis use in the past year (Adhikari and Summerill, 2000). In 2001, the lifetime rate had fallen to one-third of the population, where it remains

currently (Australian Institute of Health and Welfare, 2002). It should be noted that the wording of the question on lifetime use changed from 1998 (Adhikari and Summerill) to 2001 (Australian Institute of Health and Welfare), which may explain the drop in those reporting lifetime cannabis use. Although recent use of cannabis is still high compared to other illicit drugs (almost two million Australians had recently used cannabis), the percentage reporting past year use in 2004 (11%) is significantly lower than was found in 2001 (13%) or 1998 (18%).

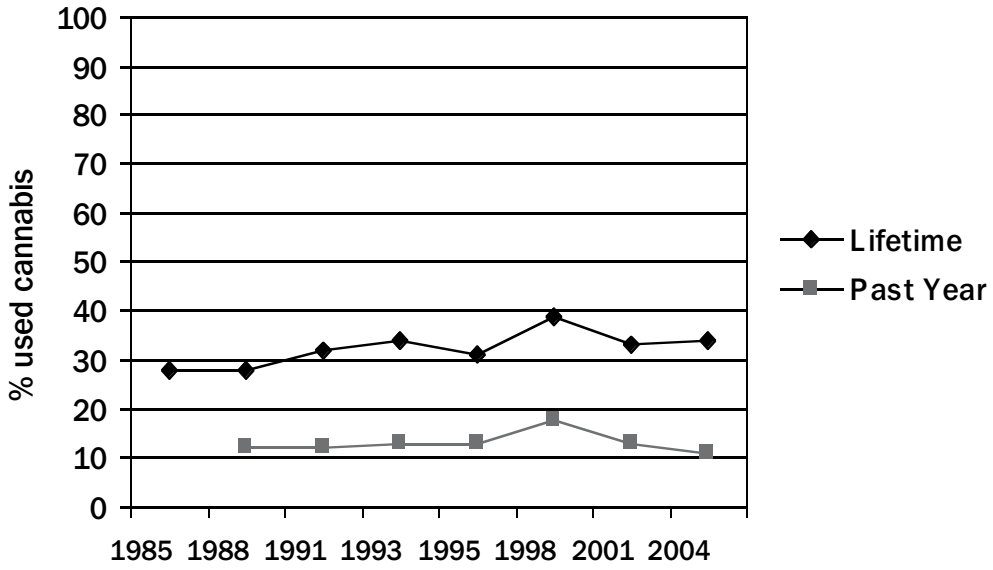

Figure 2. Lifetime and past year prevalence of cannabis use by Australians, 1985-2004

(Source: National Drug Strategy Household Survey)[2]

Of those that had used cannabis during their lives, the mean age of first use is approximately 19 years old (Australian Institute of Health and Welfare, 2005b). Cross-sectional analysis of household survey data suggests that the age of first use of cannabis has decreased over time. Analysis of the 1998 survey found that the age of initiation into cannabis use decreased as the age group examined became younger (Degenhardt et al., 2000b). Younger age groups were significantly more likely to have tried cannabis than older age groups, and their average age at the time of their first use of cannabis was younger. This trend is concerning because of the association between earlier initiation of cannabis use and dependence, which in turn is associated with a greater likelihood of experiencing cannabis-related problems (Degenhardt et al., 2000b). According to the 2004 household survey, the average age that cannabis was first used was 14.9 years amongst those aged 12 to 19, compared with 19.1 amongst those aged 20 or older, although this is in part due to the age group itself (Australian Institute of Health and Welfare, 2005a).

2 Caution should be exercised when interpreting changes in cannabis use between 1985 and 1993 due to major changes in sampling and methodology of the surveys (Donnelly and Hall, 1994).

Another concerning change in the use of cannabis between age groups that has been reported based on cross-sectional analysis is that younger users are more likely to use more potent parts of the cannabis plant (i.e. the flowering heads), whereas older users were more likely to prefer to smoke the less potent leaves (Hall et al., 2001).

Young people and adolescents

As part of the National Drug Strategy, Australian secondary school students aged between 12 and 17 years old have been surveyed about their use of over-the-counter and illicit drugs. These surveys have been undertaken in 1996, 1999, 2002 and 2005 (Letcher and White, 1999; White, 2001; White and Hayman, 2004; White and Hayman, 2006). The methods used in each survey have remained fairly consistent, meaning that results can be compared across the three surveys (White and Hayman, 2004).

Consistent with the general population data, cannabis is the most common illicit substance used by Australian secondary school students. In 2005, most students had not tried cannabis; about one in five students (18%; N=21,805) reported using cannabis at least once during their lives (White and Hayman, 2006). One in seven (14%) students had used cannabis in the past year, 7% had used in the past month and 4% had used in the past week. Of those who had used cannabis in the previous year, a substantial proportion (34% of males and 25% of females) reported that they had used it more than ten times, although a greater proportion (35% of males and 43% of females) had only used it once or twice in the past year.

As with the general population, cannabis use among adolescents varies by age and sex. Cannabis use was more common among the older students than the younger ones. For example, 5% of students aged 12 years old reported ever using cannabis compared to 32% of 17-year-old students. More male than female students reported cannabis use and of those who had used cannabis, males were more regular users than females.

Cannabis smoking is primarily a social activity for students. Most students reported using cannabis with others at either a friend's place or a party. Smoking cannabis using a bong was the most common route of administration, followed by smoking a joint. There were some differences in terms of location of use and route of administration between those who used cannabis regularly over the past year and those who only used occasionally. Regular users were more likely to smoke cannabis using a bong, whereas occasional users were more likely to smoke it in a joint. Additionally, regular users were more likely to report using cannabis alone than occasional users (White and Hayman, 2006).

There were significantly fewer students reporting cannabis use in 2005 compared with previous years (White and Hayman, 2004; White and Hayman, 2006). To place this in the context of Australian students' other drug use, decreases were also seen in this survey in the use of inhalants and hallucinogens, but no consistent change occurred in students' use of opioids (although decreases had been evident between 1996 and 2002) amphetamines, cocaine or ecstasy.

Aboriginal and Torres Strait Islander peoples

National statistics show that the health of Australia's Aboriginal and Torres Strait Islander peoples is worse than the health of the non-Indigenous population (Trewin and Madden, 2003). According to the most recent statistics, Aboriginal and Torres Strait Islander peoples have lower life expectancy and higher rates of disease and injury than the general population (Trewin and Madden, 2003). Contributing to this poorer health status are higher rates of hazardous substance use (Ministerial Council on Drug Strategy, 2003).

Historical and social factors have contributed to the widespread use of tobacco and the harmful use of alcohol among Aboriginal and Torres Strait Islander peoples. Tobacco was supplied to Aboriginal and Torres Strait Islander peoples by their employers and the government until the late 1960s. The consumption of alcohol among Aboriginal and Torres Strait Islander peoples was banned until the late 1960s, so large amounts of alcohol was consumed over a short period of time to avoid detection. This early practice has been passed onto younger generations (Ministerial Council on Drug Strategy, 2003). The use of illicit drugs, in particular cannabis, is higher among Aboriginal and Torres Strait Islander peoples than among the general population in Australia (Commonwealth Department of Human Services and Health, 1994; Perkins et al., 1994; Clough et al., 2004b).

Data from the 2001 National Drug Strategy Household Survey indicate that half of those respondents identifying as Aboriginal or Torres Strait Islander had tried cannabis during their lives and over one-quarter (27%) had used cannabis in the past year (Australian Institute of Health and Welfare, 2002). These percentages are markedly higher than the corresponding statistics from the whole sample for that year (33% of respondents reported having tried cannabis and 13% reported recent use).

In 1994, as part of the National Drug Strategy, a survey was conducted assessing drug use among Aboriginal and Torres Strait Islander peoples living in urban areas. Results showed that almost half (48%) had tried cannabis in their lives and over one in five (22%) had used cannabis in the previous year. By comparison, the prevalence of lifetime and recent cannabis use among the general population living in urban areas around the same time was 36% and 13% respectively (Commonwealth Department of Human Services and Health, 1994). Regular use (at least weekly use) was also more common among Aboriginal and Torres Strait Islander peoples (11%) than non-Indigenous (4%) people. As is the case with the general population, in the urban Indigenous sample, cannabis use was more common among males than females and among those in their 20s than younger or older age groups (Commonwealth Department of Human Services and Health, 1994). Although alcohol was perceived as more of a concern than cannabis among the people interviewed, a large proportion of the sample nominated cannabis as the drug most associated with having a 'drug problem'.

A state-wide survey of school students in New South Wales (NSW) revealed that the use of cannabis is significantly higher among Aboriginal and Torres Strait Islander students than non-Indigenous students (Ferero et al., 1999). After adjusting for socio-demographic variables, they were 1.6 times more likely to have ever tried cannabis than non-Indigenous students. The rate of substance use is likely to be even higher among Aboriginal and Torres Strait Islander students who do not attend school; a group that was not captured in that study (Ferero et al., 1999).

There is a lack of research into the substance use of Aboriginal and Torres Strait Islander peoples living in non-urban areas in Australia, in part due to the isolated and mobile nature of members of non-urban Indigenous communities (Clough et al., 2004a). However, the research that has been published suggests that Aboriginal and Torres Strait Islander peoples living in non-urban areas, such as the remote communities in the Northern Territory (NT), also have high rates of use, when compared to the general population (Clough et al., 2002; Clough et al., 2004b). The prevalence of current cannabis use in some communities, particularly among young males, is alarmingly high given that cannabis was not detected in surveys conducted in this area during the mid-1980s (Clough et al., 2004b). For example, 67% of males aged 13 to 34 years in one Arnhem Land community were regular cannabis users according to one survey (Clough et al., 2004b).

The favoured route of administration among cannabis users in these communities is via a 'bucket bong', which constitutes a very efficient way to smoke cannabis that minimises loss of side-stream smoke and is an effective way to 'binge smoke' cannabis (see Clough et al., 2004b, for a description of this technique). The recent rapid rise in cannabis use in this area of Australia is also of concern given the strong association between cannabis and other substance use among this population, that already has high rates of other substance use (Clough et al., 2004b; Clough, 2005). In particular, the practice of mixing tobacco with cannabis can lead to nicotine dependence, but cannabis intoxication and regular use may be associated with increased use of other intoxicants.

The reasons for high rates of cannabis use among Aboriginal and Torres Strait Islander peoples are likely to be complex, and are likely to be related to the social determinants of drug use. The social determinants of drug use refer to the risk (and protective) factors associated with harmful substance use and are often related to poor social and economic factors. This issue is discussed further below, under 'Factors affecting cannabis use and the social determinants of drug use' and 'At-risk groups'.

Medicinal use of cannabis

In Australia the use of cannabis for any purpose is illegal. Although there have been some suggestions that clinical trials of cannabis for medicinal purposes should be conducted (e.g. the NSW government in 2003), no jurisdiction has indicated that they will conduct trials in the near future, and there does not appear to be widespread support for medical trials at the government level.

There is some evidence, from clinical research and case reports, that cannabis (more specifically, the cannabinoid THC) reduces nausea and stimulates appetite, which can benefit cancer patients undergoing chemotherapy, and those suffering from HIV/AIDS-related wasting syndrome. There is some evidence suggesting that THC can also assist with the symptoms of multiple sclerosis due to its anti-spasmodic properties (e.g. Zajicek et al., 2005). Cannabis may have analgesic properties which could benefit sufferers of a wide range of disorders, and may also act as an anti-glaucoma agent (see Hall et al., 2001, for a review).

The prevalence of medicinal cannabis use in Australia is currently unknown, and, up until recently, there had not been a study published in Australia that had interviewed

medicinal cannabis users about their experiences. In 2004, Swift and colleagues (2005) surveyed over 100 users of cannabis for medicinal purposes. The vast majority of participants smoked cannabis, although they were concerned with the harms associated with this route of administration. Two-thirds mixed tobacco with the cannabis. One in four participants had experienced adverse legal consequences due to their medicinal use of cannabis. This exploratory study found that participants, who usually suffered from more than one condition, most commonly used cannabis to combat depression, chronic pain, arthritis, migraines, weight loss and nausea. The use of cannabis to help alleviate depression may be of concern given the purported causal link between cannabis use and subsequent depression, although this link is debated (Swift et al., 2005).

Cannabis use in other countries

Cannabis accounts for the majority of drugs trafficked illegally around the world and is the most commonly used illegal substance globally (United Nations Office on Drugs and Crime, 2005). According to the 2005 *United Nations World Drug Report*, the production and consumption of marijuana is widespread, with most countries reporting domestic cultivation. North America is reported to account for about one-third of global marijuana production. Cannabis resin, or hash, is less common globally than marijuana. Hash is mainly produced in Morocco, Afghanistan and Pakistan, and the biggest market for this form of cannabis exists in Western Europe. Indicators suggest that the global cannabis market has been expanding since the early 1990s and continues to expand (United Nations Office on Drugs and Crime, 2005).

United States of America

In the USA, two major national surveys of drug use have been conducted since the 1970s: the National Survey on Drug Use and Health (formerly known as the National Household Survey on Drug Abuse) and the Monitoring the Future project. The former is a general population survey that interviews a representative sample of Americans aged 12 years or older each year (Substance Abuse and Mental Health Services Administration, 2004). The latter is also conducted annually and collects information on the drug use of students in grade 12, some of whom are then followed up until the age of 45. For the past 14 years, students in grades 8 and 10 have also been included in the survey (Johnston et al., 2005).

Cannabis is the most commonly used illicit drug in the USA (Substance Abuse and Mental Health Services Administration, 2004). According to the 2003 National Household survey, 41% of Americans reported ever using cannabis and 11% reported past year use of the drug. About 6% of the population in the USA are current users of cannabis, meaning that they reported using cannabis in the month prior to the survey, and just over one percent reported daily cannabis use.

Due to the long history of household surveys in the USA, trends over time can be examined more confidently than in other countries, including Australia. The number of new cannabis users in the USA increased during the 1960s and 1970s, decreased during the 1980s and increased again until 1995. Between 1995 and 2002 the number of new cannabis users has varied from year to year with no consistent trend (Substance Abuse and Mental Health Services Administration, 2004).

The Monitoring the Future data have shown that cannabis has been the most widely used illicit drug among students in the USA for the past 30 years (Johnston et al., 2005). In 2004, almost half (46%) of students in Grade 12 reported lifetime use of cannabis. The lifetime prevalence rates of students in grades 10 and 8 were lower, but still substantial (35% and 16% for grades 10 and 8 respectively). Past year prevalence rates for students in grades 8, 10 and 12 were 12%, 28% and 34% respectively, and past month rates were 6%, 16% and 20% for grades 8, 10 and 12 respectively.

Trends in cannabis use among American students mirror that of the American general population household survey: cannabis use increased until a peak in the late 1970s, decreased during the 1980s and increased again until the mid-1990s. However, since 1997, the rates of cannabis use have decreased (Johnston et al., 2005).

Canada

In 2004, the Canadian Centre on Substance Abuse conducted a national telephone survey assessing the drug and alcohol use of Canadians aged 15 years and over (Adlaf et al., 2005). Prior to this survey, two similar surveys had been conducted, in 1994 and 1989 (MacNeil and Webster, 1997).

Almost half of Canadians (45%) reported ever having used cannabis, and 14% reported using the drug in the past year. Males were more likely to have used cannabis (50%) than females (39%) and younger people were more likely to have used the drug than older people. Almost 70% of those aged 18 to 25 years reported lifetime cannabis use (Patton and Adlaf, 2005). There was wide variation in the frequency of use among those reporting cannabis use in the past year, with about one-fifth reporting no use in the past three months, one-quarter reporting less than three occasions of use, one-fifth reporting weekly use, and another one-fifth admitting to daily use.

Cannabis use has become more prevalent over time in Canada. The prevalence of past year use of the drug was 7% in both the earlier surveys conducted in 1989 and 1994, compared with 14% in 2004.

Unlike Australia and the USA, Canada has not consistently undertaken a national survey of school students' drug use. However, a survey of students in grades 7 to 12 in Ontario has been conducted every two years since 1977. In 2003, 35% of students reported using cannabis at least once, and 30% reported use of the drug in the past year (Adlaf and Paglia, 2003). Older students were more likely to have used cannabis in the past year than younger students, but, unlike Australia, there was no sex difference. There were no significant short-term trends in cannabis use among Canadian students. However, long-term trend analysis revealed that cannabis use increased during the 1970s. Decreases in cannabis use during the 1980s were followed by an increase during the 1990s and stability since the late 1990s and early 2000s (Adlaf and Paglia, 2003). This trend is similar to the overall patterns of cannabis use seen in the USA, but slightly different to that seen in Australia, which recorded increased use of cannabis during the 1980s.

New Zealand

The most recent statistics on cannabis use in New Zealand are from a national telephone survey of those aged 15 to 45 years conducted in 2001 (Wilkins et al., 2002). Like the other countries reported on so far, cannabis is the most widely used illicit drug in New Zealand, with over half of those interviewed (52%) reporting that they have tried cannabis at least once during their lives. One in five New Zealanders reported that they have used cannabis in the past year. Most of those that had used cannabis in the past year had done so infrequently. Only 4% of the sample reported using cannabis more than 10 times in the past month.

As is the case in Australia and North America, more men have used cannabis in New Zealand than women, and current use is most common among those aged 18 to 24 than other age groups.

The number of respondents reporting cannabis use (ever or past year) had not changed from the previous national survey, which was undertaken in 1998. One change that was noted between the two surveys was that young women (aged 15 to 17 years) that reported trying marijuana increased from 26% to 38%. Young women reporting past month use also increased between 1998 (6%) and 2001 (15%).

Europe

A recent report by the European Monitoring Centre for Drugs and Drug Addiction showed that hash was the most common form of cannabis used in Germany, Ireland, Portugal and the UK, while marijuana was the most common form of cannabis used in Austria, Belgium, Estonia, Czech Republic and the Netherlands (European Monitoring Centre for Drugs and Drug Addiction, 2004a).

Since 1996, The United Kingdom Home Office has included questions on illicit drug use as part of the British Crime Survey (BCS), which is a representative survey of English and Welsh citizens (Chivite-Matthews et al., 2005). Before this time, there was no national survey conducted consistently in Britain (Donnelly and Hall, 1994). Unlike household surveys conducted in other countries, there is a maximum age cut-off in the illicit drug section of the BCS; only those aged 16 to 59 are administered the self-complete drug use module.

The most recently published survey, conducted in 2003/2004, revealed that 31% of British citizens aged between 16 and 59 years had used cannabis during their lives and 11% had used cannabis in the past year (Chivite-Matthews et al., 2005). Approximately 7% had used the drug in the month prior to the survey.

Between 1996 and 1998 there was an increase in cannabis use in the UK, but since 1998 the use of cannabis has remained stable. It is not possible to examine trends in cannabis use in the UK during the 1970s and 1980s due to lack of data (Donnelly and Hall, 1994).

Elsewhere in Europe, the prevalence of cannabis use is also low compared to North America and Australia. According to the European Monitoring Centre for Drugs and Drug Addiction, the lifetime prevalence of cannabis use among adults is between 5% and 10% in Belgium, Hungary, Estonia and Portugal, and is between 24% and 31% in Denmark, Spain and France (European Monitoring Centre for Drugs and Drug

Addiction, 2004b). Past year prevalence ranges from 2% in Greece to 11% in the Czech Republic. As is the case in other Western countries, the use of cannabis is more prevalent among males than females, and among younger age groups. European countries that have collected consistent population data on drug use have shown that cannabis use increased markedly during the 1990s, just as it has done in North America and to a certain extent in Australia. Some European countries are also reporting a levelling-off of cannabis use in more recent years (European Monitoring Centre for Drugs and Drug Addiction, 2004b).

Other countries

One of the gaps in cannabis research identified in the most recent World Health Organization report on the health effects of cannabis was the lack of epidemiological data on patterns and consequences of cannabis use in developing countries (World Health Organization, 1997).

The United Nations Office on Drugs and Crime (UNODC) collects statistics from a large number of countries on the supply of and demand for illicit drugs, and publishes these statistics in the United Nations World Drug Report (United Nations Office on Drugs and Crime, 2005). It should be noted that methodologies used to generate these statistics differ for each country, thus reducing the comparability of statistics. However, the UNODC employs a number of extrapolation techniques to maximise the comparability.

In Africa the average 12 month prevalence of use is approximately 8% of the population aged 15 to 64 years. Obviously the prevalence varies between each country; some countries such as Ghana report past year prevalence of 22% while others such as the Ivory Coast report very low rates of cannabis use among their population (0.01%). In Central and South America, the average past year prevalence of cannabis use is just 3%; in Asia it is even lower (2%). Obviously, as with Africa, the use of cannabis varies between countries in these areas (see United Nations Office on Drugs and Crime, 2005, for further details).

Summary

According to most recent data, the past year prevalence of cannabis use, which represents the key indicator to measure the extent of substance use, is similar in the USA, UK and Australia (11%). Canada and New Zealand have slightly higher annual prevalence rates (14% and 20% respectively). Elsewhere in the world, the annual prevalence of cannabis use is generally under 10% (United Nations Office on Drugs and Crime, 2005). It should be noted that comparisons between countries should be treated with caution, given the differing methodology and timing applied to the surveys in each of these countries, and it is unknown whether the differences stated here between countries are of statistical significance (United Nations Office on Drugs and Crime, 2005).

Whereas data from the USA and Canada indicate a rise in cannabis use during the 1970s then a decrease during the 1980s followed by an increase in use during the 1990s, Australian data indicate that the use of cannabis has increased steadily since the 1970s until prevalence of use reached a peak in 1998 (see Figure 2).

Other indicators of cannabis use in Australia

Drug treatment data

Each year, the Australian Institute of Health and Welfare publishes data on Australia's drug treatment services and their clients. In 2004-05, cannabis was the second most common drug for which treatment was sought, after alcohol. Over one in five (23%) treatment 'episodes' identified cannabis as the principal drug of concern (Australian Institute of Health and Welfare, 2006). In 2000-01, the first year of the alcohol and other drugs national minimum data set, cannabis (14%) was the third most common principal drug of concern, after alcohol (34%) and heroin (28%). In each subsequent year, however, cannabis was the second most common principal drug of concern (21% in 2001-02, 22% in 2002-03 and 2003-04). It should be noted that the method of recording treatment episodes changed after the first year of collection (2000-2001), so changes between 2000-2001 and subsequent years should be interpreted with caution. For this reason, only data from 2001-2002 onwards have been included in Figure 3 below.

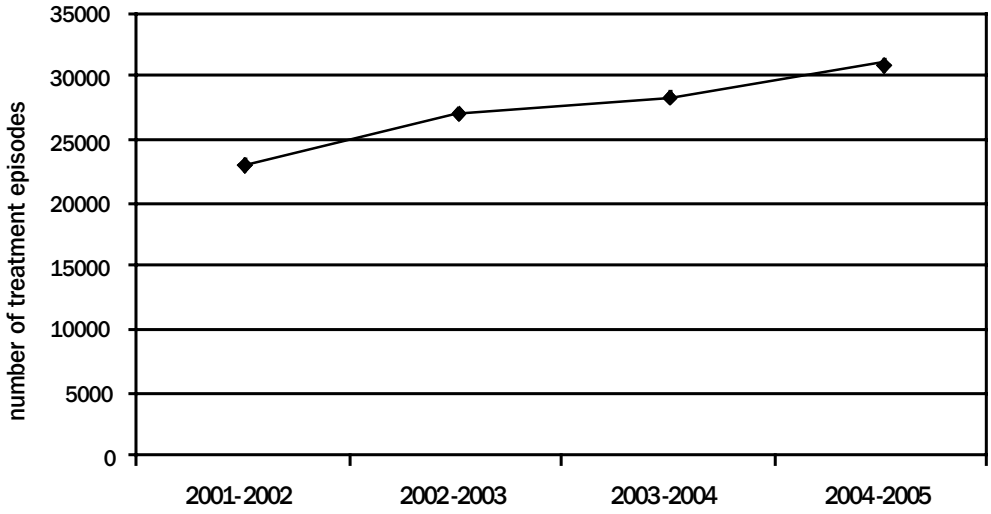

Figure 3. Number of closed treatment episodes in Australia where cannabis is the principal drug of concern, 2001-02 to 2004-05

Younger age groups are more likely to report cannabis as the principal drug of concern when compared with older age groups, for whom alcohol is the most common substance reported as their major concern. Amongst those aged between 10 and 19 who received treatment in 2003-2004, 49% nominated cannabis as the principal drug of concern. Cannabis was also the most common principal drug of concern among those aged between 20 and 29, but alcohol was the most common drug of concern for those aged 30 and older (Australian Institute of Health and Welfare, 2005d).

In 2001 the fourth national census of clients of treatment service agencies (COTSA) was undertaken in Australia. Almost one in ten (9%) clients nominated cannabis as the reason for their presentation to the treatment centre (Shand and Mattick, 2002).

Alcohol (35%) and heroin (32%) were the most common drugs nominated. The proportion of clients presenting for treatment for cannabis use increased with each census (4% in 1990, 6% in 1992 and 7% in 1995). The outcome of treatment for cannabis dependence is discussed under 'Treatment for cannabis dependence'.

Hospital data

According to the National Hospital Morbidity data, in 2004-05, 2,771 people were admitted to Australian hospitals for a cannabis-related disorder. Since 1998-99, the number of drug-related hospital admissions that are due to cannabis use has increased (see Figure 4), although as a proportion of drug-related hospital presentations, cannabis-related presentations have remained relatively steady, ranging from 4% to 6% (Source: AIHW National Hospital Morbidity Database).

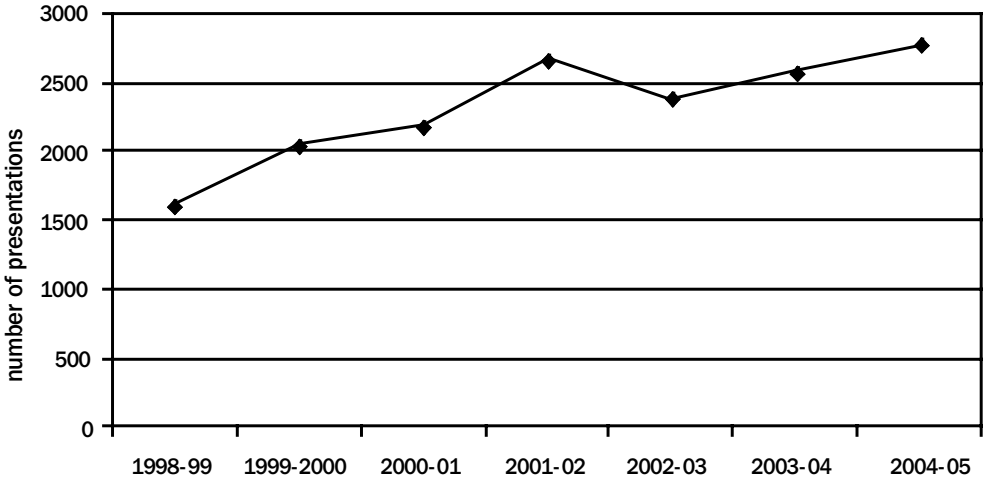

Figure 4. Number of cannabis-related presentations to Australian hospitals, 1998-99 to 2003-04

Arrests

According to the Australian Crime Commission's *Illicit Drug Data Report* (Australian Crime Commission, 2006), in 2004-05 there were 54,936 cannabis-related arrests. This constitutes 71% of all drug-related arrests during this period. Most (84%) cannabis-related arrests were for personal use rather than supply. The number of cannabis-related arrests has fluctuated between approximately 45,000 and 55,000 over the last seven years (Australian Crime Commission, 2005). It should be kept in mind that most cannabis users are not arrested; it has been estimated that the proportion of cannabis users who are arrested in any one year is approximately 1.5% (Lenton, 2000). Characteristics and outcomes for those arrested for cannabis-related offences is discussed in the section entitled 'Social harms associated with cannabis use'. Under the section 'Cannabis policy and legislation in Australia', there is a discussion of research that has assessed the impact of different legislative regimes on arrests.

Surveys of drug-using populations

Cannabis use among injecting drug users (IDU) and regular 'ecstasy' (MDMA) users is high, with 82% of IDU and 81% of regular 'ecstasy' users reporting recent use of cannabis, and substantial proportions of these drug-using populations reported daily cannabis use (Stafford et al., 2005b; Stafford et al., 2005c). However, only 13% of regular ecstasy users and 7% of IDU reported cannabis to be their drug of choice. As pointed out by Stafford and colleagues (2005c), the frequent use of cannabis among these drug-using populations may be related to cannabis being cheaper and more readily available than their drug of choice (i.e. ecstasy or heroin).

Surveys of those in contact with the criminal justice system

Drug Use Monitoring in Australia: Since 1999 the Australian Institute of Criminology (AIC) has operated the Drug Use Monitoring in Australia (DUMA) program. Each quarter, police detainees from seven sites across Australia (Adelaide and Elizabeth in South Australia, East Perth in Western Australia, Bankstown and Parramatta in NSW, and Southport in Queensland) are surveyed about their drug use as well as demographic information, treatment history, drug market information, and information on prior contact with the criminal justice system. They are also asked to volunteer to provide a urine sample.

Data collected through DUMA have revealed very high rates of cannabis use among police detainees. In 2005, averaged across sites, 54% of male and female detainees tested positive to cannabis, which was the most commonly-detected illicit drug. Rates of use were higher for younger age groups; for example, amongst males aged 18 to 20 years, 65% tested positive to cannabis (Mouzos and Smith, 2006). It should be noted that these rates indicate use in the previous month, since urinalysis can detect use up to 30 days. From 1999 to 2005, cannabis use amongst police detainees has fluctuated, with some sites recording decreases, some recording increases and some remaining stable.

Drug Use Careers of Offenders: The AIC also runs a research project that assesses the drug use 'careers' of adult prisoners, and juvenile detainees. In 2001, almost two-thirds of adult male prisoners reported regular illicit drug use and 53% reported regular cannabis use, which is much higher than the general population (Makkai and Payne, 2003). Female offenders also had high rates of cannabis use, with 40% reporting regular cannabis use in the six months preceding the survey (Johnson, 2004). In the study assessing the drug and alcohol use, and criminal behaviours of, juveniles aged 10 to 17 in detentions centres during 2003-2004, it was found that almost all (94%) had ever used cannabis and 63% reported regular use of cannabis (Prichard and Payne, 2005). When compared to a similar age group in the general population, juvenile offenders were five times more likely to have ever used cannabis. In both the adult male and the juvenile samples, the majority reported that offending preceded drug use. In contrast, amongst the female offenders, drug use generally preceded involvement in crime.

Cannabis and other drug use

Most users of cannabis use other drugs and alcohol, and are therefore known as 'poly-drug' users. According to the household survey conducted in 2004, 86% of

recent cannabis users reported using alcohol at the same time as cannabis, 28% had used amphetamines at the same time, and 24% had used ecstasy at the same time. Only one in ten recent cannabis users had not used another drug with cannabis on at least one occasion (Australian Institute of Health and Welfare, 2005b).

According to the National Survey of Mental Health and Well-being, cannabis use is associated with the use of tobacco, alcohol and other drugs. Three-quarters of dependent cannabis users also used tobacco compared with 22% of those who were not current cannabis users (i.e. had used cannabis five or less times in the previous 12 months). Almost one in five dependent cannabis users were also dependent on opioids, stimulants or sedatives compared with less than one per cent of non-users and three per cent of non-dependent cannabis users. Thirty-seven per cent of dependent cannabis users also had an alcohol use disorder, compared with 23% of non-dependent users and 5% of non-users (Swift et al., 1999).

Among a sample of regular, long-term cannabis users, the majority (93%) used drugs other than cannabis on a monthly basis (Swift et al., 2000). Among injecting drug users (IDU) interviewed across Australia in 2004, 97% had used cannabis before and 82% had used in the previous six months (Stafford et al., 2005c). Similarly high rates are found among ecstasy users, with 96% reporting that they have tried cannabis before and 81% reporting cannabis use in the previous six months (Stafford et al., 2005b).

Of particular concern is the relationship between cannabis use and tobacco use. Because cannabis is often mixed with tobacco when used, there is some concern that cannabis use may lead to nicotine dependence. A recent study found that cannabis use predicted later nicotine dependence in a cohort of young Australians, although the mechanism via which this relationship occurs could not be determined (Patton et al., 2005).

The association between cannabis and alcohol use is of concern in relation to the effects of driving, with some studies showing that the combination of these two drugs may have a cumulative adverse effect on driving (Drummer et al., 2004).

Cannabis has been described by many as a 'gateway drug', meaning that the use of cannabis in some way causes the use of other illicit drugs such as amphetamines, cocaine and heroin. Drug policy in the USA is particularly driven by this argument and aims to prevent the use of cannabis in part to prevent the use of 'harder' drugs such as cocaine and opioids (Office of National Drug Control Policy, 2003). This hypothesis is one that has fostered much debate and controversy.

Research has consistently shown that most people who use drugs such as amphetamines, cocaine and heroin used cannabis first (e.g. Kandel and Yamaguchi, 2002). Those subscribing to the gateway hypothesis argue that cannabis plays a causal role in the uptake of use of other drugs, either through exposure to illicit drug markets when purchasing cannabis (the drug market exposure hypothesis), or through the effects of regular cannabis use on the brain leading to an increased sensitivity to the desirable psychoactive effects of other illicit drugs (the sensitivity hypothesis). An alternative explanation is that a third factor, such as propensity for risk-taking behaviour, causes both the use of cannabis and the use of other drugs. This is also known as the 'common-factor' hypothesis.

Cross-sectional and longitudinal studies have found a relationship between cannabis use and subsequent use of other drugs (see Hall and Lynskey, 2005, for a review). For example, a prospective study conducted in New Zealand found that cannabis use was significantly associated with later use of other illicit drugs, even once a variety of observed and non-observed factors were controlled for (Fergusson et al., 2006). Furthermore, a twin study has shown that cannabis use predicts the use of other illicit drugs even once genetic and environmental influences are controlled for (Lynskey et al., 2003).

The sensitivity hypothesis to explain the gateway effect is plausible given that drugs exert their pharmacological effects via common neural pathways. Animal studies have shown that self-administration of opioids is more likely following earlier exposure to cannabinoids (see Hall and Lynskey, 2005, for a review). However, these findings are not perfectly analogous to the way humans use cannabis, and they do not fully explain certain aspects of the gateway effect such as the finding that it varies with age (Fergusson et al., 2006).

Studies from the USA have shown that uptake of heroin or cocaine use can occur without the preceding use of cannabis in areas where heroin is more readily available that cannabis (see Hall and Lynskey, 2005, for a review). This supports the view that uptake of illicit drug use is determined by availability and opportunity, and it is this increased opportunity to use harder drugs usually available to cannabis users that is responsible for the association between early cannabis use and later use of other drugs. More support for this explanation comes from an American study that found that a greater proportion of young people that had used cannabis had the opportunity to use cocaine than those who had not used cannabis (Wagner and Anthony, 2002).

The rationale for the common-factor hypothesis comes from studies finding associations between other deviant behaviours (such as early school leaving) and the use of illicit drugs such as cannabis as well as heroin and amphetamines (e.g. Osgood et al., 1988). A statistical modelling study was able to mimic the outcomes consistent with cannabis being a gateway drug even though cannabis use was not causally related to the use of other drugs in the model. The outcomes (i.e. that cannabis users, particularly frequent cannabis users, were more likely to go on to use other illicit drugs at a later stage than non-users) were entirely explainable by the differing propensity to use illicit drugs, and supported the common-factor model (Morral et al., 2002). However, as mentioned, longitudinal research has shown that the relationship between cannabis use and later use of other drugs persists once a number of personal characteristics have been controlled for statistically (Fergusson et al., 2006).

Currently, the evidence that cannabis has a causal relationship with subsequent use of illicit drugs is convincing, but not definitive, in that longitudinal research may not be adequately controlling for common factors that are associated with both cannabis use and later use of other drugs (MacCoun, 2006). Further research is needed to elucidate which of the explanations for the gateway effect is correct. A number of commentators have pointed out that the drug market exposure hypothesis and the sensitivity hypothesis have disparate policy implications, with the former suggesting decriminalisation (meaning the offence is still illegal, but does not attract a *criminal* charge) or legalisation of cannabis to separate the cannabis market from other illicit drugs (as has been carried out in the Netherlands), and the latter sensitivity

hypothesis lending itself to prohibition (Hall, 2006). Hall and Lynskey (2005) suggest a variety of research that could help settle the debate: animal research that can be extrapolated to humans' use of cannabis; intervention studies to test whether delaying cannabis use prevents the uptake of other drugs; replication of the genetic study discussed above; and studies based in the Netherlands, where the cannabis market has been separated from the market for other illicit drug use.

Hall and Lynskey (2005), in their recent review of this topic, point out that it is the early initiation and regularity of cannabis use that is the strong predictor of use of other drugs. Those who experiment irregularly with cannabis are not at a high risk of initiating the use of cocaine or heroin and most users of cannabis do not progress to the use of other drugs. However, this does not disprove the argument that (regular or early) cannabis use plays a causal role in the use of other drugs.

Factors affecting cannabis use and the social determinants of drug use

The factors associated with harmful cannabis use may also be associated with harmful patterns of other drug or alcohol use. These underlying causes, also known as the social or structural determinants of drug use, could be such things as a lack of educational, occupational and social opportunities, mental health issues or poor family relationships. Research has shown that there is no single risk factor that leads to problematic drug use; rather, environmental and societal factors interact with the individual and affect health and social outcomes, including problematic drug use such as harmful cannabis use (Spooner, 2005). Each individual has a combination of risk factors and protective factors that influence the likelihood that they will go on to develop a substance use disorder.

The social determinants of drug use have been explored recently by Spooner and Hetherington (2005). A number of risk factors across the life course for the development of substance use disorders were identified, including genetic predisposition, drug use in pregnancy, early behavioural and emotional problems, and exposure to drugs during adolescence. These risk factors are compounded by low socio-economic status, poor parenting and cognitive problems.

In addition to these developmental and individual risk factors, societal systems, culture and the physical environment also influence the incidence of substance use disorders. Examples include societal norms with respect to drug use, government social policies, housing issues such as overcrowding and proximity to drug markets, and accessibility of public transport.

The authors point out that certain interventions can be undertaken to help prevent drug use disorders in the face of such risk factors. For example, providing services for adolescents outside of school, diverting drug offenders into treatment, or providing assistance for drug-dependent pregnant women (Spooner and Hetherington, 2005).

The social context and perception of cannabis use in Australia

In Australia, cannabis is most often used in social situations with friends. In the mid-1990s, a survey was undertaken to examine the Australian general public's perception

about the health effects of cannabis (Hall and Nelson, 1995). Of those that could identify negative health effects of cannabis, respiratory disease and mental problems such as memory loss were most commonly identified. However, a substantial proportion (one in four) of the sample did not know what the health effects were, or even if there *were* negative health effects associated with the use of cannabis. There was an overall perception that it is acceptable to use cannabis in moderation. When asked to compare cannabis with other drugs (licit and illicit), cannabis was most commonly identified as the least dangerous while heroin was most often identified as the most dangerous drug.

More recently, a group of young Australians were interviewed as part of the development of the National Illicit Drug Campaign. Their perception of cannabis was as a relatively harmless drug that is used by everyday people. Respondents believed that tobacco was a more harmful drug than cannabis, which was only slightly more dangerous than alcohol (Clark et al., 2003). According to the most recent household survey, around one-quarter of Australians think that regular use of cannabis is acceptable (23%) and support the legalisation of the drug (27%).

However, the most recent household survey also shows that almost one in three Australians nominated cannabis as the first drug they thought of when they heard 'drug problem' (Australian Institute of Health and Welfare, 2005c). Cannabis was second only to heroin in this question, which was nominated by 39% of Australians. Furthermore, the majority of Australians believe that the penalties for the sale or supply of cannabis should be increased.

Although cannabis is used widely in Australia, and a proportion of Australians support its legalisation and believe that it is relatively harmless, there is also a significant proportion of the population that believe it is a harmful drug that should be controlled further (Australian Institute of Health and Welfare, 2005c).

CANNABIS SUPPLY

Statistics on the prevalence of cannabis use, presented above, indicate the existence of high demand for the substance. Given than cannabis is an illicit drug, a sizeable black market exists to meet this demand.

Availability

The prevalence of cannabis use in Australia suggests that the drug is widely available. Most of the cannabis is domestically produced rather than imported, which means that availability is not vulnerable to changes in the global cannabis market (Australian Crime Commission, 2005). According to the most recent household survey of illicit drug use, about one in five (20.6%) Australians stated that they had the opportunity to use cannabis in the previous 12 months. This level of availability is slightly lower than in 2001, when almost one-quarter of Australians over the age of 14 had the opportunity to use cannabis (Australian Institute of Health and Welfare, 2005c).

The Illicit Drug Reporting System (IDRS) monitors illicit drug markets nationally, and includes an annual survey of key experts from the illicit drug field, injecting drug users and analysis of indicator data (Breen et al., 2004). According to the survey of injecting drug users conducted in 2005, cannabis was 'easy' or 'very easy' to obtain, which is consistent with previous years (Breen et al., 2004; Stafford et al., 2004; Stafford et al., 2005a).

Price

Each year, the Australian Crime Commission presents data on illicit drugs collected by law enforcement agencies. According to the data collected in 2004-05, the price for an ounce (28 grams) of cannabis ranged from $150 for leaf cannabis in NSW to $400 for hydroponically-grown cannabis in Western Australia (Australian Crime Commission, 2006). One gram generally costs around $25. It should be noted that data were not available for all jurisdictions.

According to injecting drug users interviewed for the 2005 IDRS, the price of cannabis remained stable compared to previous years, ranging from $200 for one ounce of outdoor-grown cannabis in NSW or hydroponically-grown cannabis in South Australia, to $300 for the same amount of hydroponically-grown cannabis in NSW, Queensland, Western Australia and the Northern Territory (Stafford et al., 2005a). Price differences between hydroponic and naturally-grown cannabis become more marked as the quantity being purchased becomes greater (Australian Crime Commission, 2006).

Seizures and arrests

Evidence indicates that most of the cannabis that is seized in Australia is domestically produced. It is relatively easy to cultivate cannabis in Australia given the country's space and climate (Single et al., 1999). As such, the majority of cannabis imports into Australia involve small amounts sent through the post or imported by air passengers with no links to organised crime. There have been a relatively small

number of seizures of large scale imports with organised criminal involvement in recent years (Australian Crime Commission, 2006).

Both methods of growing cannabis (hydroponic and natural) are common in Australia, although it is more common for police to detect hydroponically-grown cannabis in residences (Australian Crime Commission, 2006). While more plants can be grown outdoors, hydroponic cannabis can be grown all year round, and generate a greater amount of heads (the most potent part of the plant) per plant than naturally-grown cannabis (Australian Crime Commission, 2006).

The *number* of cannabis seizures in Australia has remained relatively stable over the past five years. The *weight* of cannabis seizures has been less stable over that time period. For example, during 2003-2004 the weight of cannabis increased quite markedly compared to the previous financial year, largely because of record amounts of cannabis seized by NSW state police. A similar peak in the weight of cannabis seizures was seen during 2001-2002, due in part to the large amount seized by the Australian Federal Police in Victoria (Australian Bureau of Criminal Intelligence, 2001; Australian Bureau of Criminal Intelligence, 2002; Australian Crime Commission, 2003; Australian Crime Commission, 2004; Australian Crime Commission, 2005).

Overall, the number of cannabis-related arrests has also remained fairly stable in Australia in recent years. Across the country there were 54,936 cannabis-related arrests during 2004-05, which accounts for 71% of all drug arrests during that time. The vast majority (84%) of arrests were for cannabis possession rather than cannabis supply offences (Australian Crime Commission, 2006).

CANNABIS HARMS

Although cannabis does not directly cause death from overdose in humans, there are some significant harms associated with cannabis use, particularly for those who are vulnerable and/or who use heavily. The physical harms of cannabis include an increased risk of accident when driving under the influence of cannabis, respiratory problems when cannabis is smoked, and cardiovascular problems in those who are vulnerable. Cannabis intoxication can cause cognitive deficits such as poorer memory and attentional problems (as might any intoxicant), but there is not enough evidence to conclude that these deficits persist after cannabis use is stopped for at least a few weeks. Cannabis represents one of many risk factors for the development of psychotic disorders such as schizophrenia, such that heavy cannabis use may trigger psychosis in those who are predisposed to suffering from such disorders. There is some evidence that cannabis use is associated with later development of depression or depressive symptoms, but more research is needed. There is not a lot of evidence for a causal relationship between cannabis use and anxiety disorders. Although regular cannabis use is commonly said to be associated with poor motivation, there is no convincing research supporting this view. The social harms associated with cannabis use include: poor family relationships, increased involvement in crime, less financial stability, and potentially poorer educational and occupational performance. These may not be a direct result of cannabis use per se, but could be due to an underlying cause that leads to both problematic cannabis use and poor social outcomes.

Morbidity associated with cannabis

In the 19th century, the Irish physician W. B. O'Shaughnessy tested the effects of cannabis on animals. Since no deaths occurred from the administration of cannabis to these animals, even at very high doses, he concluded cannabis to be a very safe drug (Adams and Martin, 1996). Since then, studies have shown that very large doses of THC administered to small animals can actually cause death; however, in humans there is no known record of death by THC overdose (Hall and Pacula, 2003). Relatively few cannabinoid receptors are found in the brain stem, which may explain why administering a very high dose of cannabis does not cause fatal overdose in humans, given the role of this structure in respiration (Iverson, 2004). Although it is true that cannabis does not cause death due to toxicity in humans, there is growing evidence that cannabis use has the potential to have adverse physical, psychological and social outcomes, and contribute to mortality and morbidity (Hall et al., 2001).

Adverse physical effects of cannabis

As mentioned already, the administration of very high doses of THC to small animals can cause death by cardio-pulmonary arrest, but the amount of THC that would need to be administered to humans to cause death is prohibitively large (Hall and Pacula, 2003). However, there are a number of adverse physical outcomes that can be explained by either the acute or chronic effects of cannabis.

Respiratory problems and cancer risk

The link between smoking cannabis and respiratory problems and cancer is not as straight forward as the one between tobacco smoking and these health issues, due to a relative shortage of research (Melamede, 2005). Complicating the issue is the high incidence of tobacco smoking among cannabis users, given the known effects of tobacco smoking on respiratory health and cancer risk (Swift et al., 1999).

There is evidence that long-term cannabis smokers are more likely to suffer from respiratory symptoms such as chronic cough, sputum production, wheezing and bronchitis than non-users, even after controlling for tobacco smoking (e.g. Tashkin et al., 1987; Taylor et al., 2000; Moore et al., 2004).

There is mixed evidence for the relationship between cannabis use and cancer. On the one hand, cannabis smoke contains relatively high concentrations of carcinogens and has been found to convert cells into a pre-cancerous state. It has been found that more tar is inhaled and retained in the respiratory tract when cannabis is smoked than when tobacco is smoked (Wu et al., 1988). Furthermore, THC is said to impair the immune system's anti-tumour defences (Wu et al., 1988; Tashkin et al., 2002). On the other hand, some cohort studies have not found a relationship between mortality associated with respiratory disease and cannabis use (e.g. Sidney et al., 1997), and THC has been shown to also have anti-tumour properties (Blázquez et al., 2003). Furthermore, the pharmacological properties of cannabis smoke differ from tobacco smoke, and there is evidence that the latter has greater carcinogenic properties than the former (Melamede, 2005).

In a comprehensive review of epidemiological and case-control studies assessing the link between cancer and cannabis use, Hashibe and colleagues (2005) conclude that there is not enough evidence to draw a conclusion about whether cannabis causes cancer. They point out the discrepancy in the results of different studies, with some finding a relationship between cannabis use and cancer, and others not, and suggest that these discrepancies may be accounted for by the disparate methodologies employed. They also suggest that it may be too soon to detect cannabis-related cancer in those who have been long-term and frequent cannabis users.

Cardiovascular effects

Cannabis increases the heart rate, particularly for occasional users, since it has been found that regular cannabis users develop a tolerance to this physiological effect (Jones, 2002). There is evidence that cannabis smoking is occasionally associated with adverse cardiovascular events, such as myocardial infarction (e.g. Mittleman et al., 2001; Caldicott et al., 2005) or stroke (e.g. Mouzak et al., 2000). However, these events are rare, and cannabis smoking in general does not create serious health problems in those who are young and have healthy cardiovascular systems (Jones, 2002). In those who have cardiovascular disease, cannabis has been shown to have adverse outcomes given its cardiovascular effects (see Hall and Solowij, 2006, for a review).

Reproductive effects

Cannabinoid receptors are found in the hypothalamus, which is a structure in the brain that indirectly controls the sex hormones (Brown and Dobbs, 2002). Animal studies have shown that cannabis exposure can affect reproductive functioning such that THC administration was associated with a reduction in the release of such hormones. In humans, a reduction in testosterone levels following cannabis use have been found by some studies, but these results have not been replicated in other studies, which may be due to tolerance to the effect, or methodological differences (see Brown and Dobbs, 2002, for a review). Other effects of cannabis that have been shown in animal studies are sperm abnormalities in males and delays in oestrus and ovulation in females, but these results have not been consistently found in human research (Hall and Pacula, 2003).

Cannabinoids have the potential to have an adverse impact on the foetus since, like other drugs and alcohol, they reach the foetus through the placenta. Again, while animal research indicates that THC leads to birth defects such as growth retardation, the research on humans is less convincing. This is mainly due to the difficulties in assessing this relationship in humans because of under-reporting of drug use during pregnancy, and the confounding effects of tobacco and alcohol use, which are likely to operate in women who use cannabis during pregnancy (Hall and Pacula, 2003). However, there are a few studies that have controlled for possible confounders (e.g. Klonoff-Cohen et al., 2006) and these have generally found that cannabis use causes decreases in birth weight. However, the effect is small (Hall and Pacula, 2003). The authors of a meta-analysis assessing this link conclude that there is little evidence that infrequent cannabis use during pregnancy causes low birth weight and there is inadequate data on the birth outcomes associated with higher levels of cannabis consumption (English et al., 1997). There is a suggestion that cannabis use during pregnancy may lead to later developmental effects for the children, but further research is required (see Hall and Pacula, 2003, for a review).

Immunological effects

The cannabinoid receptors CB_2 are located in the immune system, which means that cannabis may effect this system in some way (Hart, 2005). The issue of whether cannabis has an adverse effect on the immune system is significant, given the therapeutic use of cannabis in those suffering from diseases affecting the immune system, such as cancer or HIV/AIDS (Hall et al., 2001).

Laboratory studies have shown that cannabis and cannabinoids can alter immune functions *in vitro* and in animals. Most of these studies have found that cannabinoids have inhibitory effects on immune cells, although some recent studies have found that cannabinoids can have a stimulatory effect on immune cells, possibly due to a dose-dependent effect of the cannabinoid THC. For example, studies have found that low doses of THC stimulate T-cells, while higher doses inhibit T-cells (see Croxford and Yamamura, 2005, for a review). While laboratory studies show that cannabinoids do have an effect on a variety of immunological functions, often the levels of cannabinoids that are administered to animals and used in *in vitro* studies are too high for the effects to transfer to real-world use of cannabis (Klein et al., 1998). Human studies looking at the effect of smoked cannabis on the immune system

have produced mixed results, and there is a lack of prospective research in humans to determine whether cannabis smoking is associated with increased susceptibility to infectious diseases as a result of a compromised immune system (Croxford and Yamamura, 2005).

Much like the literature on the reproductive effects of cannabis, the literature on the immunological effects is inconclusive. An adverse effect of cannabis on immunity is found in animal and laboratory studies, but the research on humans is limited (Hall et al., 2001).

Cannabis and driving

The acute effects of cannabis may adversely affect driving ability and increase the risk of accident (Blows et al., 2005). The role that cannabis plays in road accidents has received much attention over the recent past, and some jurisdictions in Australia have drafted or introduced new legislation that allows for random road-side drug testing trials. Victoria is the only state so far that has trialled such a program.

Among the Australian population, approximately 3% of people report driving while under the influence of drugs other than alcohol (Australian Institute of Health and Welfare, 2005b). Among drug-using populations, driving under the influence of drugs is far more common than among the general population, as would be expected. For example, Darke and colleagues found that 57% of injecting drug users (IDU) had driven while under the influence of cannabis in the 12 months prior to interview and one in five had done so at least weekly (Darke et al., 2004). Almost one-third of IDU reported having a 'drug-driving' accident at one time (9% in past year). The mean number of drugs involved in the most recent drug-driving accident was just over two, with heroin/cannabis and cannabis/alcohol the most common combinations. Among a sample of police detainees in Australia, 40% reported that they had driven after using cannabis in the past year, and approximately one-quarter stated that they drove regularly after using cannabis (Poyser et al., 2002). A study of current cannabis users found that 29% of cannabis users had driven under the influence of cannabis (DUIC) in the year prior to interview (Jones et al., 2003). Prevalence of DUIC, at least occasionally, was 90% among long-term cannabis users on the North Coast of NSW (Reilly et al., 1998).

The above studies show that driving while under the influence of cannabis is sufficiently prevalent to warrant concern, if it can be established that cannabis intoxication impairs driving ability and leads to greater incidence of accidents.

In a recent comprehensive review of drug-driving literature, Kelly and colleagues (2004) discuss studies that have investigated the effect of cannabis on driving. These studies fall into three main categories: laboratory studies, which test the effects of cannabis on skills that are used in driving, such as reaction time and attention; simulator studies, which assess the effect of cannabis on driving using specially-made equipment that mimics what it is like to drive a car; and field studies, which assess the relationship between accidents and cannabis use in the real world. Laboratory studies have shown that even low doses of THC compromise reaction time, attention, decision making, time and distance perception, short-term memory, hand-eye coordination, and concentration; these skills are all needed when driving a vehicle.

The simulator studies are more realistic than the laboratory studies, but are still not the same as real-world driving. These studies have found that cannabis causes a range of problems, such as a poor ability to maintain lane control and steering difficulty, and that these problems become worse with higher doses of THC. However, Kelly and colleagues (2004) point out that the association between cannabis and poor driving is weaker in these simulator studies than in the laboratory studies, due to people under the influence of cannabis compensating for their intoxication by going slower and maintaining a greater distance between themselves and the car in front. This strategy may reduce some risks, but does not help if something unexpected happens on the road.

Field studies look at the relationship between cannabis use (known from blood or urine analysis, or from self-report) and accidents resulting in injury and/or death. These studies have found higher rates of cannabis use among people who have been involved in accidents than what would be expected by chance. Recent driver culpability studies have found that drivers testing positive to cannabis were significantly more likely to be responsible for fatal car crashes than drug-free drivers (Drummer et al., 2004; Laumon et al., 2005). However, other earlier studies using culpability analysis have not found such a relationship (e.g. Longo et al., 2000). As pointed out by Jones and colleagues (2005), these kinds of studies cannot control for other characteristics of people who DUIC that may place them at risk of motor vehicle accident.

Some studies that have assessed self-reported cannabis use and involvement in accidents have found that long-term cannabis use is associated with car accidents (Blows et al., 2005). However, the association between long-term cannabis use and motor vehicle accidents disappears or decreases once other variables (such as risky driving behaviour and gender) have been controlled for (Fergusson and Horwood, 2001; Blows et al., 2005). Studies that have assessed the relationship between self-reported cannabis intoxication and accident involvement have provided mixed results, with some finding a positive association (e.g. Ramaekers et al., 2004; Asbridge et al., 2005) and others finding no such association (e.g. Jones et al., 2005).

One of the difficulties of determining the effect of cannabis on driving is disentangling the effect from the known effect of alcohol on driving performance, since cannabis and alcohol are commonly used in combination. There is some evidence to suggest that cannabis and alcohol have an additive deleterious effect on driving (Doria, 1990; Drummer et al., 2004). Overall, although the literature on cannabis and driving is not unequivocal, there is enough evidence to suggest that DUIC is associated with a certain degree of motor vehicle accident risk and is something that should be prevented (Jones et al., 2005).

Cannabis and injury

Many of the psychomotor effects of cannabis outlined above in the context of the effect of cannabis on driving can also have adverse effects on the ability to operate other transportation (such as aeroplanes) or machinery in the workplace, and may lead to an increase in accidents and injury (Wadsworth et al., 2006). A recent review that assessed the literature on the association between cannabis and injury risk found that cannabis use is associated with a higher risk of a variety of injuries (i.e. injuries

due to collisions, intentional injuries and other injuries) but points out that more rigorous research is needed to exclude alternative explanations for this association (McDonald et al., 2003). It should be pointed out that this review did not include work on the association between injury in the workplace and cannabis use. There is not much research on this particular association, with existing work suggesting a link between cannabis use and absenteeism and turnover rather than injury (Wadsworth et al., 2006). The link between job performance and cannabis is discussed further below ('Educational and occupational performance').

Effect of cannabis on cognitive functioning

Research has shown that cannabis impairs a number of cognitive abilities in the short-term in a dose-dependent manner. Experimental studies have shown that cannabis intoxication leads to the subjective experience of time passing more quickly than real time (e.g. Tinklenberg et al., 1972; Solowij et al., 2002). Other cognitive abilities that are adversely affected by cannabis use include attention, reaction time, and higher cognitive functioning such as mental arithmetic. Cannabis intoxication has been most consistently associated with impaired short-term memory, most likely through cannabis decreasing the ability to maintain concentration and focus attention (see Solowij, 1998, for a review).

There is not much debate about whether the acute effects of cannabis influence cognitive functioning in the short-term. This effect is a concern in the context of impaired driving ability or performance at school or in the workplace. However, perhaps of greater concern is the suggestion that cannabis use causes chronic cognitive impairment. The evidence for this is less straight-forward, given the problems inherent in proving a cause and effect relationship between a variable of interest (in this case cannabis use) and a subsequent outcome (in this case cognitive deficits).

There is no convincing evidence that cannabis use causes structural abnormalities in the brain in adults, but the effect on brain development when cannabis is used in adolescence is less well-researched (de Lisi et al., 2006). There is some evidence that early cannabis use has neurotoxic consequences due to effects on brain development during adolescence, and may affect brain function and metabolism, although it is not known whether these effects translate into long-term cognitive dysfunction (Hall and Solowij, 2006).

Studies have shown that long-term and regular cannabis users perform more poorly than non-users on tasks assessing short-term memory, executive functioning and attention, even when they are not acutely intoxicated with cannabis (Pope et al., 2002; Solowij et al., 2002; Lundqvist, 2005; Messinis et al., 2006). Solowij and colleagues (2002) have found that this poor performance is correlated with the number of years of cannabis use and conclude that long-term cannabis use leads to lasting cognitive deficits. However, this study only assessed cognitive functioning after a median of 17 hours of abstinence. Deficits found after short periods of abstinence may be related to the residual effects of cannabis, or to the symptoms of cannabis withdrawal (Bolla et al., 2002). One study that assessed cognitive functioning in cannabis users after a longer period of abstinence (28 days) have found that there was no statistical difference between cannabis users and their low-use or non-

using counterparts (e.g. Pope et al., 2002). Another study did find a difference, such that after 28 days of abstinence very heavy cannabis users displayed deficits on neuropsychological measures of memory, executive functioning and manual dexterity, when compared to their lighter cannabis-using counterparts (Bolla et al., 2002). These disparate results may be due to different definitions of 'chronic' cannabis users, with the former study defining level of marijuana use by frequency and duration, and the latter defining it by the number of joints smoked per week. One very recent study found that chronic cannabis users who had been abstinent for a minimum of three days did not differ from drug-naïve participants on tests of memory, whereas chronic ecstasy users showed a markedly poorer performance on the memory tests than both the controls and the cannabis users (Quednow et al., 2006).

A longitudinal study that measured IQ before and after regular cannabis use has shown that global IQ declines with current heavy cannabis smoking (Fried et al., 2002). However, this effect did not persist once cannabis use was ceased. It has been found that early-onset cannabis users displayed poorer cognitive performance than late-onset users or controls after 28 days of abstinence, but this difference was not significant once verbal IQ was controlled for (Pope et al., 2003). A study that assessed the cognitive performance of monozygotic (identical) twins discordant for regular cannabis use, and who had not used cannabis regularly for at least a year, found that only one out of the numerous measures of cognitive performance was performed more poorly by participants who had used cannabis regularly compared with the non-cannabis-using twins (Lyons et al., 2004).

A recent review aimed to determine whether regular long-term cannabis use is associated with cognitive dysfunction that cannot be explained by the acute effects of intoxication or withdrawal (Grant et al., 2003). The review found a significant negative effect of long-term regular cannabis use on neuropsychological tasks assessing learning and retrieval, but the effect was of a small magnitude, and may have been due to residual effects of intoxication, since some studies tested users after less than one day of abstinence. The authors conclude that they did not find evidence for "a substantial, systematic effect of long-term, regular cannabis consumption on the neurocognitive function of users who were not acutely intoxicated" (Grant et al., 2003, p. 685). Overall, while cannabis use is associated with cognitive deficits in the short-term (i.e. during the period of intoxication), and among current long-term cannabis users, there is no strong evidence to suggest that these deficits persistent once cannabis use is ceased (Hall et al., 2001; Iverson, 2005).

Cannabis and psychosis

An issue that attracts much attention in the scientific literature and media is the potential link between the use of cannabis and the development of psychosis. *Psychosis* describes a mental disorder that impairs the sufferer's ability to distinguish reality from fiction. It is characterised by the following signs and symptoms: delusions, which involve having beliefs that are not true; hallucinations, which involve sensing things that are not there such as hearing voices; and gross disorganisation of speech and/or behaviour such that the sufferer's speech and actions do not make sense (American Psychiatric Association, 2000). Psychosis is usually thought of in association with schizophrenia, but is also present to varying degrees in over ten

additional mental disorders (American Psychiatric Association, 2000). Psychotic disorders can be devastating for the sufferer and their families, and represent a substantial burden on the community. It should be noted that discrete psychotic *symptoms* can be experienced without necessarily being part of a psychotic *disorder*. If the symptoms are severe enough, or there are enough symptoms co-occurring for a long enough time period, then a psychotic disorder may be diagnosed.

Evidence for an association between cannabis use and psychosis

The association between cannabis and psychosis has a long history; in the mid-19th century the French psychiatrist Moreau (1973, cited in Mechoulam and Hanus, 2004) documented the effects of hashish intoxication in his students and claimed that such intoxication serves as a model of psychosis. More recently, case reports and controlled studies have documented the development of psychosis and psychotic symptoms in individuals after using cannabis, but the results have been equivocal due to variability in the symptoms reported and lack of control for pre-existing psychosis vulnerability. However, very high doses of the drug can produce a 'toxic psychosis' (see Hall, 1998, for a review).

Epidemiological research has shown that rates of cannabis use and dependence are higher among those with psychosis than among those in the general population (e.g. Degenhardt and Hall, 2001). Studies of cannabis users sampled from the community have also shown greater rates of psychotic experiences than would be

expected by chance (e.g. Thomas, 1996). However, the direction of causality is not elucidated by this type of research; cross-sectional studies cannot determine whether cannabis use causes psychosis, whether psychosis predisposes one to use cannabis, or whether there is a common factor that causes both cannabis use and psychosis (Hall, 1998).

There is a dearth of experimental research on the psychotomimetic (psychosis-producing) effects of cannabis in humans, largely because of the ethical issues surrounding this process (Degenhardt, 2003). Having said that, one recent study has documented a variety of temporary psychotic experiences following the administration of THC to healthy human volunteers (D'Souza et al., 2004), but replication of these results is needed before definitive conclusions can be drawn from this line of research. The alternative, less ethically dubious, method to determine the direction of causality is to conduct prospective studies that follow large samples of individuals over time and document their use of cannabis and their experience of psychotic symptoms while controlling for possible confounding variables (Degenhardt, 2003).

The recent surge of interest world-wide in the link between cannabis and psychosis (e.g. Cheetham, 2004; Home Office, 2005) is due in part to the results of some key prospective studies (Andreasson et al., 1987; van Os et al., 2002; Zammit et al., 2002; Caspi et al., 2005; Ferdinand et al., 2005; Fergusson et al., 2005; Henquet et al., 2005). These studies have shown that cannabis use predicts later psychotic disorders or psychotic symptoms. The findings are made more convincing by the fact that they remain significant after controlling for a range of potential confounding variables such as pre-existing psychotic symptoms (e.g. Arseneault et al., 2002), other drug use (e.g. Arseneault et al., 2002) and childhood factors (e.g. Fergusson et al., 2005). The association has been found to be stronger for heavier users of cannabis, those who begin using cannabis earlier, and those with a predisposition to psychosis (Arseneault et al., 2002; Henquet et al., 2005).

It should be noted that the outcome measure in these studies varies. Some studies assess later psychotic *symptoms* (Fergusson et al., 2005; Henquet et al., 2005), while others assess diagnosis of, or hospitalisation for, a full-blown psychotic *disorder*, such as schizophrenia (Andreasson et al., 1987; Arseneault et al., 2002; Caspi et al., 2005). It is not known to what extent the psychotic symptoms measured in the former studies adversely impact the lives of those experiencing them. In contrast, a diagnosis of schizophrenia is known to have a severe adverse and long-lasting impact on sufferers and their families. Overall though, there is evidence to suggest that cannabis use increases the risk of suffering from psychotic symptoms or a psychotic disorder such as schizophrenia by at least between two and three times, once a variety of confounding factors have been controlled for.

It is important to point out that hospital presentation data in Australia shows that psychosis related to amphetamine use is more common than psychosis related to cannabis use, which, given the much lower rate of amphetamine use than cannabis use in the Australian population, suggests that the risk of experiencing a psychotic disorder from amphetamine use is higher than the risk associated with suffering from a psychotic disorder after using cannabis (Roxburgh and Degenhardt, in press).

Table 1. Prospective studies of cannabis use and psychotic symptoms or disorders (adapted from Arsenault et al., 2002).

Authors (year)	Sample	Cannabis use measure	Outcome	Controls	Adjusted odds ratio (95% CI)
Andreasson et al (1987)	45,570 Swedish male conscripts, aged 18	Used cannabis more that 10 times by age 18	Hospital admission for schizophrenia 15 years later (age 33)	Psychiatric diagnosis at age 18, social background, tobacco, alcohol and solvent use	2.3 (1.0-5.3)
Zammit et al (2002)	50,053 Swedish male conscripts, aged 18	Used cannabis more than 50 times by age 18	Hospital admission for schizophrenia 27 years later (age 45)	Psychiatric diagnosis at age 18, IQ, social integration, disturbed behaviour, tobacco use, place of upbringing, other drug use.	3.1 (1.7-5.5)
van Os et al (2002)	4,104 Dutch males and females from population sample, aged 18-64	Used cannabis at baseline	a) Low-level psychotic symptoms (using BPRS) 3 years later b) Pathological-level symptoms c) Need for treatment	Age, gender, ethnic group, marital status, education, urban dwelling, discrimination.	a) 2.8 (1.2-6.5) b) 24.2 (5.4-107.5) c) 12.0 (2.2-64.3)
Arsenault et al (2002)	759 New Zealander males and females from Dunedin birth cohort	Used cannabis at age 15, continued use at age 18	a) Schizophrenia at age 26 symptoms b) DSM-IV diagnosis of schizophreniform disorder at age 26.	Gender, social class, psychotic symptoms prior to cannabis use.	a) Significantly more symptoms than those who did not use cannabis b) No significant effect
Fergusson et al (2005)	1,011 New Zealander males and females from Christchurch birth cohort	Cannabis dependence at age 21	Psychotic symptoms at age 21	Other drug dependence, gender, IQ, parental criminality.	1.8 (1.2-2.6)
Henquet et al (2005)	2,437 German males and females from population sample, aged 14-24	Used cannabis at least 5 times at baseline	Any psychotic symptoms 4 years later	Baseline use of other drugs, predisposition to psychosis, age, gender, socioeconomic status, urban dwelling, childhood trauma.	1.7 (1.1-2.5)
Caspi et al (2005)	803 New Zealander males and females from Dunedin birth cohort	Used cannabis by age 15 or used regularly at age 18	DSM-IV diagnosis of schizophreniform disorder at age 26	Use of other drugs, prodromal childhood psychotic symptoms, IQ, conduct disorder.	10.9 (2.2-54.1) with genetic vulnerability, no association for those without such vulnerability

The nature of the association

A recent review of the cannabis and psychosis issue accepts that there is an association between cannabis use and psychosis but critically examines current evidence for three different hypotheses about the nature of this association (Hall et al., 2004). The first hypothesis is that cannabis use causes a 'cannabis psychosis', which refers to a putative disorder in which the onset of psychotic symptoms immediately follows the administration of cannabis and resolves after a certain amount of time once the sufferer discontinues use of the drug (Hall et al., 2004). Arguments for the existence of such a disorder are mainly based on case studies of patients who have developed psychosis after cannabis use (e.g. Chopra and Smith, 1974; Solomons et al., 1990; Wylie et al., 1995). Controlled studies that have compared patients who have developed psychosis in the context of cannabis use to drug-free psychotic patients have not led to definitive results, with some studies concluding that there is no evidence for a distinct 'cannabis psychosis' (e.g. McGuire et al., 1994) and others concluding that cannabis psychosis is a valid diagnosis that is distinct from other psychotic disorders (e.g. Nunez and Gurpegui, 2002). Hall and colleagues (2004) conclude that although cannabis may induce psychotic symptoms at high doses, the evidence for the existence of a distinct disorder called 'cannabis psychosis' is weak due to inconsistencies in findings and lack of methodological consistency and rigour. Confusion about the definition of cannabis psychosis contributes to the lack of conclusive evidence with respect to this first hypothesis about the nature of the cannabis-psychosis link (Poole and Brabbins, 1996).

Another hypothesis examined by Hall and colleagues (2004) is that cannabis use exacerbates symptoms in existing psychotic disorders such as schizophrenia. The evidence to support this hypothesis is more convincing than that around the existence of a specific cannabis psychosis. The authors review case reports and controlled studies (both prospective and retrospective) that have shown cannabis to be an independent risk factor for greater incidence of psychotic episodes and worsening of psychotic symptoms among those with a psychotic disorder. Another recent review has arrived at the same conclusion (Linszen et al., 2004), and a more recent study supports the findings of these reviews (Grech et al., 2005). Furthermore, both reviews point out that this hypothesis is biologically plausible, given the involvement of the same neurotransmitter system (the dopamine system) in both the effect of cannabis on the brain and the mechanism of action of neuroleptic medication used to treat schizophrenia (Hall et al., 2004; Linszen et al., 2004). Additionally, the same structures of the brain are involved in both the cannabinoid system and what is known of the neural circuitry of psychosis (D'Souza et al., 2004).

The third hypothesis is that cannabis use can precipitate schizophrenia in vulnerable individuals. The prospective epidemiological studies discussed above have provided good evidence to support this link, but it is still unclear whether cannabis causes a psychotic disorder, such as schizophrenia, that would not occur if cannabis had not been involved. Furthermore, the incidence of schizophrenia has not changed over time, but the use of cannabis has increased markedly (Degenhardt et al., 2001a; Rey and Tennant, 2002; Hall et al., 2004). However, it is possible that the effect of cannabis on the incidence of psychotic disorders is yet to emerge to an extent that can be measured (Arseneault et al., 2004).

The role of psychosis vulnerability

Most people who use cannabis do not develop psychosis later in life, which suggests that there is some additional vulnerability in the individuals who do. There is evidence that the association between cannabis and psychosis is greatest in those with a pre-existing vulnerability to psychosis as measured by psychosis proneness questionnaires (e.g. Verdoux et al., 2003; Henquet et al., 2005). Recently, a longitudinal study found that genetic predisposition similarly moderated the effect of cannabis on psychosis such that adolescent cannabis users with polymorphism in a gene involved in the dopamine system (the neurotransmitter system implicated in schizophrenia) were at risk of developing a psychotic disorder later, but adolescent cannabis users who did not have this genetic polymorphism were not at an increased risk of being diagnosed with a psychotic disorder (Caspi et al., 2005). Behavioural genetics has been highlighted as an area that represents one possible future direction to further the cannabis and psychosis research area (Degenhardt, 2003).

Conclusion

Overall, although the area is still contentious, there is a growing consensus that cannabis use represents a statistical risk factor for developing later psychosis, in particular for those with a vulnerability for developing a psychotic disorder (Arseneault et al., 2004; Hall et al., 2004). After reviewing existing evidence, much of which has been presented here, Arseneault and colleagues (2004) have concluded that cannabis use represents part of a collection of causal factors that lead to the development of psychotic disorders.

Cannabis and other psychiatric disorders

Depression

The first medicinal use of cannabis in the Western world was as an antidepressant and there have been case reports of depressed patients that have shown a better response to cannabis than to conventional antidepressants (Grinspoon and Bakalar, 1993; Ames and Castle, 1996). However, there is no rigorous study into the antidepressant effects of cannabis; more commonly cannabis has been associated with an increase in depression (Castle and Solowij, 2004). In general though, the association between cannabis use and depression has received less attention than the link between psychosis and cannabis (Patton et al., 2002).

Many of the studies that have been conducted report mixed results (Degenhardt et al., 2004). This could be related to the different populations studied, and the different measures and methodologies employed. Samples studied have included high school students, university students, army personnel, young adults, people presenting to primary care clinics, and people with depression, bipolar disorder and illicit drug dependence (see Degenhardt et al., 2004, for a review). The outcome measured has also varied, with some studies measuring depression as a disorder, and others measuring depressive *symptoms* such as suicidal ideation. Finally, the studies have varied in terms of the way cannabis users are categorised (a 'heavy user' in one study may not be categorised as a heavy user in another study) and compared (comparison groups may be non-users, other drug users or neither).

The USA and Australia have conducted national surveys that have assessed the level of various mental disorders in the population in recent years. In Australia, data from the National Survey of Mental Health and Well-being was used by Degenhardt and colleagues (2001b) to assess the relationship between depression and cannabis use. A positive relationship was found between cannabis use and depressive disorders, and this relationship became stronger with heavier or more problematic cannabis use. However, once other drug use was controlled for, the relationship did not remain significant. The authors concluded that there was no direct relationship between cannabis use and depression, but acknowledged that there may be an indirect one such that cannabis users are more likely to be dependent on other drugs, which may in turn increase the risk of depression.

Agosti and colleagues (2002) used the data from the United States National Comorbidity Survey to assess the prevalence of psychiatric disorders among those with cannabis dependence. They found that the vast majority (90%) of cannabis-dependent respondents also had a lifetime mental disorder, compared to just over half of those without cannabis dependence. Cannabis-dependent respondents were over two times as likely to have ever suffered from clinically-significant depression as those who were not dependent on the drug. Furthermore, those who were currently using cannabis were still twice as likely to have a *current* mood disorder as those who had never been dependent on cannabis.

Further analysis of the United States National Comorbidity Survey data showed that, although history of cannabis use and cannabis dependence was associated with an increased risk of suffering an episode of clinically-significant depression, this risk was moderate and was not greater than the risk of depression associated with being female or a tobacco smoker (Chen et al., 2002). Among Canadian adolescents, cannabis use has been found to be an independent risk factor for depression (Poulin et al., 2005). Risk was analysed in the former study by taking into account the age of first cannabis use and the age of first episode of depression and in the latter study by an instrument designed to measure depression risk. However, these are not ideal methods for evaluating whether cannabis is a causal factor for depression. Prospective studies are required to assess the causal direction of the association (if indeed there is an association) between cannabis and depression (Chen et al., 2002).

The results from prospective studies are mixed. Fergusson and Horwood (1997) assessed early cannabis use and subsequent psychosocial outcomes among a birth cohort in New Zealand and found that the rates of suffering an episode of clinically-significant depression between the ages of 16 and 18 years were significantly higher for those that had used cannabis between the ages of 15 and 16 than those who had not used the drug. However, once confounding variables were controlled for, this association was not significant. Patton and colleagues (2002) report that frequent cannabis use in Australian adolescents predicted later depression in females, even after controlling for confounding variables. A New Zealand study found, after controlling for other drug use, cannabis use at the age of 18 years old predicted both depressive symptoms and depressive disorder at the age of 26 (Arseneault et al., 2002). A longitudinal study from the USA found that depressive disorders were significantly correlated with cannabis use cross-sectionally, but not longitudinally after confounders were controlled for (Brook et al., 1998). In contrast, Bovasso (2001) examined baseline and follow-up data on almost 2,000 Americans and

found that those with cannabis abuse at baseline were significantly more likely to have depressive symptoms at follow-up than those who did not abuse cannabis at baseline. The converse relationship did not exist; depressive symptoms at baseline did not predict follow-up cannabis use. It should be noted that there were a number of potentially confounding factors that were not controlled for in this study (Degenhardt et al., 2004).

Overall, evidence suggesting that regular cannabis use is associated with elevated levels of depression or depressive symptoms is increasing (Rey and Tennant, 2002). Although results are mixed, there is a substantial amount of evidence to suggest that cannabis use, particularly frequent or heavy use, predicts depression later in life (Degenhardt et al., 2004).

Some studies have found an association between cannabis use and suicide in young people. It is unclear whether such associations are causal, and the prospective studies that have assessed this relationship have generally found that, once confounding factors (such as psychiatric diagnosis and other substance use) are controlled for, the relationship between cannabis use and subsequent suicide attempts is not significant (e.g. Fergusson and Horwood, 1997).

Anxiety

A similar paradox exists in the association between cannabis and anxiety as in the association between cannabis and depression just discussed. Just as cannabis is implicated in an increased incidence of depression but is also used by some to ameliorate the effects of depression, some cannabis users report that the drug relieves anxiety, while anxiety is also commonly reported as an adverse symptom of cannabis use (Castle and Solowij, 2004). Of particular interest is whether cannabis use is associated with the development of anxiety *disorders* (such as panic disorder, obsessive compulsive disorder or generalised anxiety disorder), which can create significant adverse outcomes in the lives of those suffering from them.

A study analysing data from the United States National Comorbidity Survey shows that respondents who were dependent on cannabis were 2.7 times more likely to have a lifetime diagnosis of generalised anxiety disorder and 2.4 times more likely to have ever had panic disorder (Agosti et al., 2002). Additionally, those with a lifetime cannabis dependence diagnosis who were currently using cannabis were 2.6 times more likely to have a *current* anxiety disorder than those who had never been dependent on cannabis. In Australia, the prevalence of anxiety disorders is higher among those with cannabis dependence (17%) compared with those who do not use cannabis (5%), according to the National Survey of Mental Health and Well-being (Degenhardt et al., 2001b). However, this relationship was not significant once confounding factors such as demographics, personality, and other drug use were controlled for.

As has been pointed out throughout this monograph, longitudinal research is needed to establish whether a relationship is causal. Two separate longitudinal studies conducted in New Zealand have not found a relationship between cannabis use and anxiety disorders (Fergusson and Horwood, 1997; McGee et al., 2000). Similarly, an American prospective study found no association between cannabis use and anxiety disorders (Brook et al., 1998). An Australian study did find a relationship,

but only for females (Patton et al., 2002). Overall, the evidence for the claim that cannabis causes anxiety disorders later in life is not supported by the limited evidence available.

Cannabis and motivation

A link has often been made between cannabis use and a lack of motivation, both in the literature and anecdotally. Cannabis users themselves have identified motivational problems as one of the adverse effects of cannabis use (e.g. Copeland et al., 2001a). It has been proposed that there is a specific 'amotivational syndrome' that is caused by chronic cannabis use (McGlothlin and West, 1968). The characteristics of this syndrome are said to include apathy, low productivity, lethargy, poor attention and concentration, and difficulty in carrying out long-term plans (Cherek et al., 2002).

Despite clinical and anecdotal support for an amotivational syndrome associated with chronic cannabis use, there is little field or laboratory evidence that substantiate the association. In the 1970s and 1980s, field studies of populations of daily long-term cannabis users failed to find evidence for an amotivational syndrome (see Hall and Pacula, 2003, for a review). A comprehensive review of the relationship between cannabis use and job performance found no evidence that cannabis directly causes poor motivation, which was one of four selected dependent variables related to job performance (Schwenk, 1998). A recent study using a self-report measure of apathy found no difference between participants who used cannabis daily to those who had not used cannabis (Barnwell et al., 2006).

Early laboratory studies assessing the effect of cannabis intoxication on motivation have generally not found an association (Cherek et al., 2002). However, two recent studies have found an association. The first study found that when adult participants smoked cannabis before a task on which they could earn money, they showed evidence of reduced motivation compared to conditions when no marijuana was smoked (Cherek et al., 2002). The second study found evidence for reduced motivation to earn money on a task among heavy cannabis-using adolescents compared to those who had not used cannabis (Lane et al., 2005). The authors argue that the measure of motivation used was more sensitive than measures used in previous studies.

Overall, although lack of motivation is often cited by users and clinicians as a symptom of cannabis use, there is little experimental evidence to support this view. Research has provided evidence that the lack of motivation observed in some cannabis users may be due to these cannabis users suffering from symptoms of depression (e.g. Musty and Kaback, 1995).

Social harms related to cannabis use

Educational and occupational performance

As discussed above, one of the acute deleterious effects of cannabis use is impairment of cognitive functioning (specifically, memory and attention). Thus, there is a concern that regular use of cannabis among adolescents would have an adverse effect on academic performance, which may in turn be detrimental to occupational outcomes

that depend on performance at high school and university. Additionally, regular use of cannabis among adults may have an adverse effect on job performance.

Poorer educational achievement (indicated by a range of measures including lower grades and more negative attitudes towards school) among cannabis users compared to non-users has been documented by a number of cross-sectional studies (see Lynskey and Hall, 2000, for a review). Longitudinal research is needed to determine whether: cannabis use causes poor educational outcomes; poor educational performance causes cannabis use; or a common factor causes both cannabis use and poor educational outcomes. There have been few prospective studies that have assessed the causal relationship between cannabis use specifically and educational outcomes, and the results have been equivocal. Some have found a relationship between early cannabis use and later poor educational and occupational outcomes which persisted once confounding factors were controlled for (Fergusson and Horwood, 1997; Brook et al., 2002; Fergusson et al., 2003a), while other studies have only found such a relationship among certain ethnic groups (e.g. Ellickson et al., 1998).

Hall and Pacula (2003) conclude cannabis use among young people and the increased risk of poor educational achievement found in longitudinal studies is likely to be explained by: the association between cannabis use in early adolescence and other risk behaviours; the relationship between conduct problems and social disadvantage, and later cannabis use; cannabis use increasing the likelihood of being influenced by other delinquent and substance-using peers; and the acute effects of cannabis intoxication on educational performance among young people who use cannabis daily.

Research assessing the link between cannabis use and occupational outcomes is difficult to summarise, given the lack of a standard measure of job performance. A comprehensive review assessing studies employing a range of methodologies to assess the link between cannabis use and job performance found that there was no consistent relationship, but was able to conclude the following: experimental research shows that cannabis adversely affects performance on job-related tasks measuring attention, learning and psychomotor skills; cannabis intoxication is associated with poorer driving performance in driving simulation studies (which has relevance for jobs that require driving); self-reported cannabis use is associated with reduced labour force participation in young males; employees who use cannabis are more likely to leave their jobs and contribute to accidents, which reduce overall productivity; and there is no consistent relationship between cannabis use and motivation to work (Schwenk, 1998). Overall then, it would appear that, in general, cannabis may adversely affect job performance, but it cannot be concluded that cannabis directly *causes* poor occupational outcomes, and more research is needed.

Financial situation

To the individual, cannabis use can have adverse effects on their financial situation, since, depending on the frequency of use, significant proportions of their personal income may be spent on obtaining cannabis. Although the financial burden of cannabis dependence is not as great as for more expensive illicit drugs such as heroin, for some people it still has the potential to have an adverse effect on their daily lives.

Cannabis users report financial difficulties as one of the problems associated with dependence (Budney and Moore, 2002). There is some evidence that the financial problems associated with cannabis use are particularly pronounced for certain populations, such as the remote Aboriginal and Torres Strait Islander communities in the Northern Territory, with one study finding that cannabis users spent between 31% and 62% of their income on cannabis (Clough et al., 2004b).

Family and relationships

As outlined in the section above on the social determinants of cannabis use ('Factors affecting cannabis use and the social determinants of drug use'), poor family relationships is one of a number of risk factors for the later development of harmful substance use, including cannabis use (Spooner and Hetherington, 2005). However, frequent cannabis use may in turn contribute to poor social relationships, which may sustain harmful patterns of use (Best et al., 2005). Cannabis users cite interpersonal relationship problems as one of the problems associated with cannabis dependence (Budney and Moore, 2002).

Cannabis and crime: association and harms

There is much evidence pointing to an association between substance use and criminal involvement. Whether or not cannabis is causally related to criminal involvement is a matter of debate, and there is much less evidence for a relationship between cannabis use and crime than there is for other substances such as heroin (Hall and Pacula, 2003). Cannabis users are more likely to engage in criminal activity (other than illegal substance use) than the general population, and criminal offenders are more likely to use cannabis than the general population (Makkai and Payne, 2003). However, this association does not mean that cannabis use plays a causal role in criminal involvement. Surveys of offenders have found that criminal activity usually precedes cannabis use (Makkai and Payne, 2003; Prichard and Payne, 2005). Self-reported violence has been associated with alcohol and methamphetamine, but not cannabis (Black and Degenhardt, 2005).

Hall and Pacula (2003) analyse the evidence for a causal relationship between cannabis use and crime by using Goldstein's (1985) conceptual framework for the relationship between drug use and violent crime. Goldstein proposes three explanations for such a relationship: the psychopharmacological hypothesis, where the psychoactive properties of a drug directly cause criminal behaviour; the economically-motivated crime hypothesis, where crime is committed in order to obtain funds to sustain drug use; and the systemic crime hypothesis, where the violent crime is committed due to the nature of illicit drug markets (e.g. through disputes between participants of a drug market).

The first hypothesis is unlikely to be related to cannabis, since laboratory studies have shown that cannabis use inhibits rather than enhances aggression (Miczek et al., 1994). However, aggression is one of the self-reported symptoms of cannabis *withdrawal*, although no research has assessed whether cannabis withdrawal causes violent crime. There is not a great deal of evidence to support the second hypothesis either. Due to cannabis costing less than other drugs such as cocaine and heroin, economically-motivated crime is generally not associated with cannabis use (Hall

and Pacula, 2003). However, among school students such a relationship has been reported (Baker, 1998). Hall and Pacula (2003) conclude that systemic crime, the third hypothesis, is unlikely to apply to cannabis markets, given that most people purchase cannabis behind closed doors rather than on the street as is the case with heroin, and street-based drug markets are more likely to be associated with violent crime.

Given the lack of evidence for the above three hypotheses, it is likely that variables such as personality characteristics and environmental factors lead to both cannabis use and criminal involvement, and it is this that explains the association between cannabis and crime (Hall and Pacula, 2003).

It should be noted that most cannabis users do not commit other crimes. One of the social harms of cannabis use (for example, loss of employment opportunities) arises from the risk that individuals will become involved in the criminal justice system and receive a criminal record, (for example, if they are caught with a small amount of cannabis), when they would not have been involved otherwise (Lenton et al., 2000). Research shows that those arrested for a cannabis-related offence are the least likely of all drug-related offenders to re-offend (Valuri et al., 2002). Research also suggests that arrest for cannabis use does not decrease subsequent use, and can have adverse impacts, such as a decrease in future employment opportunities (Lenton, 2000).

Obviously, given the illicit nature of cannabis and the extent of its use in Australia, there is a large black market that supplies cannabis. It has been estimated that 165 million joints or bongs are consumed in Australia each year (Hall, 2001). This illegal market represents a substantial amount of lost revenue for the state, given that no tax is collected (Hall, 2001). Although not documented in the literature, police officers and law enforcement professionals report additional community harms associated with the illicit cannabis trade, such as fires and property damage as a result of rental properties being used to cultivate hydroponic cannabis, leading to loss of income for property owners. Electricity is stolen to establish commercial hydroponic cannabis operations. Police report increases in drug dealing and anti-social behaviour in areas where properties are being used for commercial cultivation of cannabis. Violence and other criminal activity is associated with attempts to steal cannabis products or crops, which cause community harm and place added drain on police resources. Other community or societal harms include the expenditure on cannabis and the drain of revenue from communities, and the resultant impact on quality of life, especially in small or remote communities (Ministerial Council on Drug Strategy, 2006).

At-risk groups

Adolescents and young people

Young people are identified as a particular group at risk of suffering from the harms associated with cannabis use for two major reasons. Firstly, there is evidence that those who use cannabis are initiating use at increasingly younger ages (Degenhardt et al., 2000b). This decreasing age of initiation of cannabis use is of concern given that early initiation into cannabis use is known to be associated with a greater risk of dependence, and a host of other adverse outcomes such as early school leaving, risky sexual behaviours, unemployment, and poor family relationships (Hall and Solowij,

2006). It is unlikely that these other adverse outcomes are a direct result of cannabis use; rather, they are likely to be a result of the lifestyle that is associated with early substance use (Fergusson et al., 2003a). Secondly, there is some evidence that cannabis use during adolescence, which is a time when the brain is still developing, may have deleterious effects on neural development and later cognitive functioning, although the effects are likely to be subtle (Ehrenreich et al., 1999; Wilson et al., 2000).

Aboriginal and Torres Strait Islander peoples

As mentioned previously in this monograph, national statistics (Australian Institute of Health and Welfare, 2002), and targeted research on young people (Ferero et al., 1999), and those living in urban (Commonwealth Department of Human Services and Health, 1994) and remote (Clough et al., 2004b) areas, show that cannabis use occurs at higher rates among Aboriginal and Torres Strait Islander peoples when compared to the general population in Australia. There is also some evidence that *regular* cannabis use is more common among Aboriginal and Torres Strait Islander peoples than among the general population (Commonwealth Department of Human Services and Health, 1994; Clough et al., 2004b).

Higher rates of cannabis use and the resulting harms experienced among Aboriginal and Torres Strait Islander peoples is likely to be part of a broader picture of poor health and well-being, which stems from the alienation and dispossession experienced by this population over time (Ministerial Council on Drug Strategy, 2003). Many of the social determinants of harmful substance use are disproportionately present in Aboriginal and Torres Strait Islander communities (Spooner and Hetherington, 2005).

Although more research is needed to assess recent trends in cannabis use among Aboriginal and Torres Strait Islander peoples, the research that does exist indicates that the level of cannabis use is high when compared to the general population in Australia, which, when coupled with long-standing social problems, places Aboriginal and Torres Strait Islander peoples at risk of suffering from the adverse effects of cannabis.

Those with mental health problems

As discussed above, those who suffer from a mental disorder such as schizophrenia may experience a worsening of symptoms with cannabis use. Additionally, those who are vulnerable to developing psychosis, such as people with a family history of the disorder or with a genetic predisposition, may be at risk of developing a psychotic disorder following frequent cannabis use (Caspi et al., 2005). Given this risk, the finding that cannabis use is higher among those with mental health problems than those who do not suffer from such problems is of concern, and this population should be treated as a group at risk of adverse effects from cannabis use (Hall and Solowij, 2006).

Treatment for cannabis dependence

Demand for treatment for cannabis dependence has increased since the 1990s, both in Australia and elsewhere. Admissions for cannabis dependence (as the primary problem) to drug treatment services in the United States of America tripled between 1992 and 2002 (Roffman et al., 2006). In Australia, as outlined above ('Other indicators of cannabis use'), two separate data collections have shown that

treatment-seeking for cannabis dependence has also increased since 1990 (Shand and Mattick, 2002; Australian Institute of Health and Welfare, 2005d). In 2003-04, one in five drug and alcohol treatment episodes were for cannabis primarily, making it the second most commonly-reported substance for which treatment was sought (Australian Institute of Health and Welfare, 2005d). However, only a small proportion of those who have a cannabis use disorder will seek treatment (Stephens and Roffman, 2006).

Rigorous research into effective treatment for cannabis dependence has only been pursued in the last 10 to 15 years (Budney and Moore, 2002). Treatment for cannabis dependence may be in the form of simple screening and brief intervention, more intensive multi-session psychosocial treatment, or pharmacotherapy. Two major types of psychosocial or behavioural treatments for substance use disorders (which may be used in brief or multi-session treatment regimes) are cognitive behavioural therapy (CBT) and motivational enhancement treatment (MET). The focus of CBT is on developing coping skills to deal with situations in which drug use is likely, whereas MET focuses on motivational interviewing (Stephens et al., 2006).

Screening and brief intervention sessions can be given in a variety of settings, such as general practice, which is important, since those cannabis users who do seek help will do so from their general practitioner, rather than a drug treatment service agency (Degenhardt et al., 2000a). Brief intervention sessions may involve the provision of personalised advice about the client's cannabis use, information about cannabis use and dependence, and self-help materials (Hall and Swift, 2006). Evidence suggests that there is value in brief sessions, even for highly dependent cannabis users (Copeland et al., 2001b). Treatment outcome for cannabis-dependent individuals is said to be comparable to those suffering from dependence on other substances (Budney and Moore, 2002).

The first randomised controlled trial assessing the effectiveness of a multi-session psychosocial cannabis treatment was published in 1994, and found that two types of treatment provided over ten sessions (relapse prevention therapy based on CBT, and a social support therapy placing importance on group support to remain abstinent) resulted in greater rates of abstinence (approximately one-third of participants were abstinent after seven months) and less cannabis use than those who did not receive treatment (Stephens et al., 1994). Copeland and colleagues (2001b) found that either a six-session or a single-session CBT intervention were both more effective than no treatment in reducing cannabis use and encouraging abstinence. Motivational enhancement therapy has also been found to be effective in treating cannabis dependence, and the addition of positive reinforcement for remaining abstinent can augment the positive treatment outcomes (Budney and Moore, 2002). There is no research on whether inpatient treatment for severe cannabis dependence is more effective or cost-effective than counselling-based outpatient treatments (Hall and Swift, 2006).

Presently, there is no approved pharmacotherapy for cannabis dependence, as there is for heroin or alcohol dependence. There is a call to develop pharmacotherapies for those cannabis-dependent individuals who do not respond to psychosocial or behavioural treatments such as those mentioned above (Hart, 2005). Pharmacotherapies may be used to ameliorate the symptoms of withdrawal during the initial period immediately after ceasing cannabis use, or to prevent relapse, and

they may be used in addition to psychosocial treatment (Hart, 2005). Animal studies have found that withdrawal symptoms associated with ceasing cannabis use are lessened by THC and clonidine, a drug that treats hypertension and is also used in ameliorating the effects of alcohol and opioid withdrawal (e.g. Lichtman et al., 2001). Lithium has also been found to lessen cannabis withdrawal symptoms (Cui et al., 2001). There are less human studies assessing the effects of various drugs to mitigate the effects of cannabis withdrawal, and oral THC has been the only drug that has been shown to decrease withdrawal symptoms substantially in humans (see Hart, 2005, for a review). The cannabinoid antagonist rimonabant (SR 141716A) has been shown to reduce the reinforcing effects of cannabis in animals, which may mean that it would prevent relapse in humans, but more research is needed (Hart, 2005).

The cost of cannabis use in Australia

It has been estimated that in the financial year of 1998/1999, drug and alcohol use cost Australia over $34 billion, through spending or loss of money on health, crime, productivity in the home and workplace, road accidents and fires (Collins and Lapsley, 2002). Alcohol and tobacco accounted for the majority of this cost; illicit drugs accounted for $6 billion of the cost.

In the Australian Burden of Disease and Injury study, cannabis use and dependence was estimated to account for the loss of 4,416 *healthy* years of life in 1996 (Mathers et al., 1999). However, no deaths can be attributed to cannabis, unlike heroin, which represents the greatest burden of disease of all illicit drug-related conditions, contributing to almost 25,000 health years of life lost at the time (Mathers et al., 1999). The legal drugs accounted for a greater proportion of burden of disease than the illicit drugs, with tobacco and alcohol use accounting for 9.7% and 2.2% respectively, compared to around 2% for all illicit drugs, and 0.2% for cannabis (Hall and Pacula, 2003). Therefore, although cannabis is associated with harm, which needs to be addressed, it represents a less serious cost to society, from a public health perspective, than the licit drugs alcohol and tobacco (Hall and Pacula, 2003).

It should be noted that at the individual community level, the economic cost of cannabis use can be substantial. For example, research suggests that the drain on the revenue of some remote communities located in the Northern Territory due to expenditure on cannabis is significant (Clough et al., 2004b).

RESPONSES

Cannabis policy and legislation in Australia

Australia's National Drug Strategy

Drug policy in Australia has been focused on the minimisation of drug-related harm since the initiation of the National Campaign against Drug Abuse in 1985 (House of Representatives Standing Committee on Family and Community Affairs, 2001). Harm minimisation is a philosophy that recognises the benefits of reducing the adverse physical, psychological, social and economic effects of drug use on the individual and the community, even if use of the drug continues. The principle of harm minimisation in the context of drug policy in Australia is put into practice using three different approaches: strategies that reduce the supply of drugs; strategies that reduce the demand for, and uptake of, drug use; and strategies that aim to reduce drug-related harm on an individual and community level.

In recent years, Australia's drug policies have been developed under the framework of the National Drug Strategy (NDS), which replaced the National Campaign against Drug Abuse. In addition to the principle of harm minimisation, the NDS has involved collaboration between all levels of government, and partnership between health and law enforcement. Reflecting this approach, the NDS falls under the responsibility of the intergovernmental Ministerial Council on Drug Strategy (MCDS). The MCDS consists of federal, state and territory health and law enforcement ministers, as well as the Australian Government minister for education (Ministerial Council on Drug Strategy, 2004). The MCDS is advised by the Intergovernmental Committee on Drugs (IGCD) and the Australian National Council on Drugs (ANCD). Senior officers from health, law enforcement, education and Aboriginal and Torres Strait Islander agencies make up the IGCD, while the ANCD consists of a wide range of non-government experts on drug-relevant issues such as treatment, research and education. The IGCD is responsible not only for providing policy advice, but for implementing NDS policies and programs. The IGCD is also able to commission work and obtain specialist advice from experts.

Another important aspect of the NDS is the high priority placed on research, which is important for developing evidence-based policy and services. The core research programs of three National Research Centres help inform the MCDS and IGCD of emerging issues and trends, and facilitate research into issues identified as priority by the NDS (Ministerial Council on Drug Strategy, 2004). These three research centres are the National Drug and Alcohol Research Centre (University of New South Wales, Sydney), the National Drug Research Institute (Curtin University, Perth), and the National Centre for Education and Training on Addiction (Flinders University, Adelaide). In addition to these research centres, the NDS provides funding for further research through the National Drug Law Enforcement Research Fund, and there are dedicated research funding bodies including the Alcohol Education and Rehabilitation Foundation.

National drug policy documents

National Drug Strategy: Australia's integrated framework 2004-2009: The most current *National Drug Strategy: Australia's integrated framework 2004-2009* (Ministerial Council on Drug Strategy, 2004) builds upon the preceding National Drug Strategic Framework 1998-99 to 2002-03 and has as its mission: "To improve health, social and economic outcomes by preventing the uptake of harmful drug use and reducing the effects of licit and illicit drugs in Australian society" (Ministerial Council on Drug Strategy, 2004).

Developed by a joint IGCD/ANCD working group, The National Drug Strategy 2004-2009 retains the MCDS as the body responsible for ensuring that the NDS delivers initiatives to reduce the harm associated with drug use using a nationally coordinated approach. The IGCD and ANCD are also retained as the key advisory bodies to the MCDS. The IGCD and ANCD will participate in an annual joint workshop to discuss emerging issues and priorities, based on current research and advice.

National strategies dealing with specific substances, such as the National Tobacco Strategy 2004-2009, the National Alcohol Strategy 2006-2009, and the recently-endorsed National Cannabis Strategy 2006-2009, have been developed using the framework of the National Drug Strategy.

National Drug Strategy Aboriginal and Torres Strait Islander Peoples Complementary Action Plan 2003-2006: The National Drug Strategy and its substance-specific strategies were written for Australians in general, and as a result may not adequately address drug issues that are particularly relevant to Australia's Aboriginal and Torres Strait Islander population. The *Aboriginal and Torres Strait Islander Peoples Complementary Action Plan 2003-2006* was developed as a supplement to the national action plans so that these plans could be applied to Australia's Aboriginal and Torres Strait Islander peoples (Ministerial Council on Drug Strategy, 2003).

National cannabis initiatives

Cannabis policy at a national level had, until the development of the National Cannabis Strategy 2006-2009, been outlined within broad policy documents on drugs in general, rather than being presented in a document on its own. However, the National Drug Strategy has in the past engaged a cannabis task force to investigate cannabis-related issues (Ali and Christie, 1994), which will be discussed in more detail below. Additionally, as part of the National Drug Strategy, the Australian Government has published many monographs on various issues related to cannabis in Australia, including publications on: the patterns of cannabis use in Australia (Donnelly and Hall, 1994; Makkai and McAllister, 1997); the harms associated with use (Hall et al., 1994; Hall et al., 2001); public perceptions of cannabis and related issues (Bowman and Sanson-Fisher, 1994; Hall and Nelson, 1995; Makkai and McAllister, 1997); and perhaps most extensively, legislation relating to cannabis and its consequences (McDonald et al., 1994; Ali et al., 1999; Christie, 1999; Donnelly et al., 1999; Sutton and McMillan, 1999; Lenton et al., 2000)[3].

3 Note that five of the listed publications (Bowman and Sanson-Fisher, 1994; Donnelly and Hall, 1994; Hall et al., 1994; McDonald et al., 1994; Hall and Nelson, 1995) were prepared specifically for the National Task Force on Cannabis.

In addition to providing overall policy direction to the states and territories, the Australian Government has funded a range of illicit drug initiatives that encompass cannabis, including school information and education resources, supply-reduction initiatives and programs such as the Illicit Drug Diversion Initiative (described below), under the National Illicit Drug Strategy. The Illicit Drug Diversion Initiative is currently being evaluated. Although most cannabis offences committed are domestic offences that are dealt with under state and territory legislation, there is also a suite of federal legislation related to cannabis (eg: importation and exportation offences).

Although cannabis legislation is mostly the domain of the states and territories, there is some federal legislation related to cannabis (e.g. importation).

National Task Force on Cannabis

In 1992 a National Task Force on Cannabis was assembled by the National Drug Strategy Committee to provide accurate and up-to-date information on cannabis to help inform policy. The Task Force was asked to: 1) summarise available evidence on cannabis including patterns of use and adverse health and psychological effects of the drug, 2) examine approaches taken (legislative and otherwise) by other jurisdictions (i.e. United States of America, The Netherlands, United Kingdom and South Australia), and 3) present the results of this research in a report to the National Drug Strategy Committee. The report included the presentation of cost-effective legislative and other initiatives that would control cannabis use and minimise harm that could be applied in Australian jurisdictions (Ali and Christie, 1994). The Task Force prepared four authoritative research papers on the following areas: 1) the health and psychological effects of cannabis (Hall et al., 1994), 2) the legislative options for the control of cannabis (McDonald et al., 1994), 3) patterns of cannabis use in Australia (Donnelly and Hall, 1994), and 4) public opinion with respect to the legislative options for the control of cannabis (Bowman and Sanson-Fisher, 1994).

The National Cannabis Strategy 2006–2009

As mentioned, Australia's first national strategy addressing cannabis use and its associated harms was developed during 2005 and 2006, through a comprehensive consultation process. The *National Cannabis Strategy 2006-2009* was endorsed by the Ministerial Council on Drug Strategy on 15 May 2006.

The objective of the National Cannabis Strategy (the Strategy) is to "reduce the availability and demand for cannabis, and minimise related harms within the Australian community".

Federal cannabis legislation in Australia

The importation and exportation of cannabis across the Australian border is illegal. Offences can lead to penalties of up to life imprisonment in the most serious cases involving imports or exports of commercial quantities (100kg and above for cannabis, 50kg and above for cannabis resin and 2kg and above for cannabinoids). There are also offences for quantities below a commercial quantity that have lesser penalties attached to them. More detail on offences associated with the importation and exportation of cannabis is provided in Table 4 (see page 82).

There are also new federal offences targeting commercial cultivation of cannabis, domestic trafficking of cannabis (i.e. sale and distribution within Australia), and possession of cannabis. Generally, domestic cannabis offences are enforced by state and territory law enforcement agencies whilst the Australian Government law enforcement agencies target border importation. It is not the intention of the new offences to compete with or take over the role of state and territory police. Cannabis offences will continue to be investigated in accordance with the established division of responsibility between Australian Government and state and territory law enforcement agencies. The federal offences overlap with state and territory offences and co-exist with them, giving law enforcement agencies discretion as to whether to charge an offender with the federal or state offence. The new federal offences extend to possession of cannabis for personal use (carrying a maximum penalty of 2 years imprisonment), but State and Territory drug diversion programs will be available for drug users who are charged with this offence.

State and territory cannabis policy and legislation in Australia

Australia's cannabis legislation differs between states and territories, although all legislative approaches are prohibitionist, meaning that any activities involving cannabis are illegal. In Victoria, NSW, Tasmania and Queensland, possessing or supplying any amount of cannabis is a criminal offence that can attract serious penalties such as imprisonment, although police have the option of issuing a caution or diverting into treatment or education if the offence is minor. In South Australia, the Northern Territory, the Australian Capital Territory and, as of 2004, Western Australia, those committing minor cannabis-related offences may incur an infringement notice, such as a small fine, rather than a more severe penalty such as incarceration. However, it should be noted that if the offender fails to pay the fine, a criminal charge and penalty may follow.

Infringement notice schemes

As mentioned above, four jurisdictions in Australia have special schemes that impose fines for the possession of small quantities of cannabis rather than prosecuting for a criminal offence. The specifics of each of the four approaches vary between each jurisdiction. Below is a description of these infringement notice schemes running in each jurisdiction.

South Australia: South Australia (SA) was the first jurisdiction in Australia to introduce infringement notices without criminal charge for minor cannabis offences. Since 1987, SA has had an infringement notice system for 'simple cannabis offences', which include: the possession of up to 100 grams of cannabis plant material or 20 grams of cannabis resin; the use of cannabis or cannabis resin; the possession of equipment for smoking cannabis; or the cultivation of one plant for personal use.

Originally, the cultivation of up to 10 plants for personal use was defined as a simple cannabis offence; however, this was changed to one plant in the *Controlled Substances (Expiation of Simple Cannabis Offences) Regulations 2002*, due to evidence suggesting that some individuals were exploiting the scheme by selling the cannabis obtained from the 10 plants (e.g. Ali et al., 1999). The infringement is a fine of either $50 (for possession of less than 25 grams of cannabis, less than 5 grams of cannabis resin, or smoking equipment, or for using cannabis) or $150 (for possession of between 25 and 100 grams of cannabis, between 5 and 20 grams of cannabis resin,

or one cannabis plant) and must be paid within 60 days (*Controlled Substances Act 1984*; *Controlled Substances [Expiation of Simple Cannabis Offences] Regulations 2002*). Failure to pay the fine within that period usually results in a criminal conviction. The Cannabis Expiation Notice scheme has been evaluated from a number of different perspectives (e.g. social and economic outcomes). The results of such evaluations appear under the section entitled 'Diversion Programs' below.

Australian Capital Territory: An infringement notice scheme for minor cannabis offences, known as 'simple cannabis offences' has been running in the Australian Capital Territory (ACT) since 1992. Currently in the ACT, the Simple Cannabis Offence Notice Scheme (SCONS) allows police officers to fine a person $100 if the police officer believes that the person has committed a 'simple cannabis offence', which includes the cultivation of one or two plants (excluding hydroponically-grown plants[4]), the self-administration of cannabis, or the possession of up to 25 grams of cannabis (*Drugs of Dependence Act 1989*). The fine must be paid within 60 days (Intergovernmental Committee on Drugs, 2005). Since 2002, the option of diversion rather than payment of the fine was made available (discussed below).

Northern Territory: Since 1996, Northern Territory (NT) legislation permits police to issue a fine of $200 to adults found in possession of up to 50 grams of cannabis plant material, one gram of cannabis oil, 10 grams of cannabis resin or seed, or two plants, rather than prosecuting for a criminal offence in court (*Misuse of Drugs Act 2004*). The fine must be paid within 28 days, and failure to pay the fine usually results in debt to the state rather than a conviction.

Western Australia: The Western Australian Community Drug Summit of 2001 made a recommendation that the law be changed so that prohibition of the possession and cultivation of small amounts of cannabis is enforced by civil penalties (infringement notices) rather than criminal penalties (Government of Western Australia, 2001). As a result, the Drug Law Reform Working Group was established by the government. The group's 2002 report made a variety of recommendations, which the government largely supported. In 2003 the Cannabis Control Bill was passed which allows police officers to issue a Cannabis Infringement Notice (CIN) to persons found cultivating or in possession of specified amounts of cannabis (*Cannabis Control Act 2003*).

The legislation-based Cannabis Infringement Notice Scheme superseded the policy-based Cannabis Cautioning Notice (CCN) in March 2004. The Cannabis Control Act states that police can use their discretion to serve an infringement notice if the individual is at least 18 and: is found in possession of a cannabis smoking implement; is found in possession of no more than 30 grams of cannabis; or is found with not more than two cannabis plants under cultivation on the same premises. Note that this excludes hydroponically-grown cannabis, and cannabis resin and cannabis oil are excluded because of the greater potency of these forms of the drug. If someone is served an infringement notice, they may elect to have the matter heard in court, pay the fine, which ranges from $100 to $200, or complete a cannabis education session. Those opting to pay the fine have 28 days in which to do so. If an individual is issued two or more CINs within three years, then they must attend the cannabis education session.

4 In 2005, the definition of a simple cannabis offence was narrowed. Previously the maximum number of plants that could be possessed was five. This was reduced to two and artificially (i.e. hydroponically) grown cannabis plants were excluded from the scheme (*Criminal Code [Serious Drug Offences] Amendment Act 2005*).

Western Australia also has a system in place for penalising those who sell hydroponic equipment to someone who the retailer knows will use the equipment for the cultivation of cannabis. Penalties include a fine ranging from $2,000 to $20,000 or imprisonment, and/or a ban from selling or supplying hydroponic equipment for up to two years.

Western Australia also has a scheme in place that requires operators of shops that sell smoking implements such as bongs to: display a warning notice advising of the harms associated with cannabis; make education material available about the harms of cannabis; and only sell equipment to those 18 years of age or older. Penalties for failing to comply with these requirements include fines (from $1,000 to $25,000) or imprisonment.

Table 2. Jurisdictions currently using infringement schemes for minor cannabis offences

Jurisdiction (year of initiation)	Maximum amount of cannabis allowed for option of expiation	Exclusions	Days to expiate	Age	Fine	Alternatives to paying fine
SA (1987)	• 100 grams plant material • 20 grams resin • 1 plant	Artificial cultivation; cannabis oil	60	Adults	$50-$150	Criminal conviction
ACT (1992)	• 25 grams plant material • 2 plants	Artificial cultivation; cannabis resin and oil	60	Adults and juveniles	$100	Criminal conviction or diversion
NT (1996)	• 50 grams plant material • 10 grams resin • 1 gram oil • 10 grams seed • 2 plants		28	Adults	$200	Debt to state, no conviction
WA (2004)	• 30 grams plant material • 2 plants	Artificial cultivation; cannabis resin and oil	28	Adults	$100-$200	Challenge in court or attend an education session

Jurisdictions in Australia that do not have an infringement notice scheme in place to deal with minor cannabis offences all have an Illicit Drug Diversion Initiative or caution programs that apply to minor cannabis offences (Table 3). Therefore, it is unlikely that an individual found in possession of a small amount of cannabis for the first or second time would receive a criminal conviction in these states (Copeland et al., 2005). However, unlike some of the infringement notice schemes, diversion schemes only apply to harvested cannabis and not to cultivation of plants. It is argued that by including the cultivation of one or two plants for personal use in either diversion or infringement notice schemes, users are more likely to distance themselves from the organised criminal groups involved in large-scale supply of cannabis (Lenton, 2004). Whilst this may be the case, it is also clear to operational

police that many of these user-growers are not always engaged in simply growing cannabis for personal use, but do also engage in the illegal supply and/or sale of cannabis to third parties (personal communication with Tasmania Police). Cannabis-related diversion programs are described in the next section, as part of a broader review of drug diversion programs operating around the country.

Table 3. Current diversion programs relating to minor cannabis offences in jurisdictions without infringement notice schemes

Jurisdiction (year of legislation)	Maximum amount of cannabis allowed for option of diversion	Exclusions	Number of Cautions	Age	Diversion program description
TAS (1998)	Up to 50 grams leaf, stalk, stem, head, seed. Up to 2 plants.	Concurrent violent offence or other offence proscribed.	3 in 10 years	Adults and children	First offence: caution plus information and referral. Second offence: brief intervention. Third offence: assessment and either treatment or brief intervention.
VIC (1998)	50 grams	Other concurrent offence	2	Adults	Cautioning notice plus voluntary education program
NSW (2000)	15 grams	Prior drug or violent offence, possession of cannabis resin, oil or living plants, concurrent offence.	2	Adults	Caution, plus information and referral
QLD (2001)	50 grams	Prior violence convictions, prior diversion offer, possession of oil or resin.	1	Adults and children	Mandatory for police to offer eligible offenders the option to attend a brief intervention covering assessment, education and counselling.

Diversion programs

The Australian Government, as part of the National Illicit Drug Strategy, provides funds for the Illicit Drug Diversion Initiatives (IDDI) run in each jurisdiction. The fundamental aim of the IDDI is to increase incentives for drug users to identify and treat their illicit drug use early. Other aims include decreasing the adverse social impact of illicit drug use and preventing drug-related crime, since drug treatment programs have been found to reduce criminal behaviour associated with drug use (Spooner et al., 2001; Australian Government Department of Health and Ageing, 2004). Another reason behind diversion programs, particularly the programs

that occur at the pre-arrest or pre-trial stage, is the freeing-up of police and court resources.

The IDDI has been funded since 1999. The funding has allowed for existing initiatives to be built upon, and new initiatives to be put in place where they did not exist before. Most jurisdictions commenced diversion programs under IDDI funding in 2000 or 2001 (Health Outcomes International, 2002). As of 2005, the Australian Government has allocated more than $340 million for the IDDI. Each state and territory has a certain amount of freedom to decide what form their particular IDDI will take, which means that diversion programs vary from jurisdiction to jurisdiction. Additionally, there are some diversion programs that are not funded by the IDDI, such as the adult Drug Court in NSW and Queensland.

Diversion of offenders from the criminal justice system can happen at a number of points during the criminal justice process. The earliest opportunity for diversion is prior to a charge being laid, or at the pre-arrest stage. It is at this stage that the Australian Government's IDDI places its emphasis, although it is recognised that diversion at other points can also benefit the offender and the community (Spooner et al., 2001).

According to a recent evaluation of diversion programs, most of the earlier diversions are cannabis-related, while the court-based diversion instances typically involve heroin or amphetamines as the primary drug of concern (Health Outcomes International, 2002). The IDDI is currently being evaluated nationally.

Following is an overview of current cannabis-related diversion initiatives in each state and territory. Results of evaluations are also presented, when available.

Australian Capital Territory: The Simple Cannabis Offence Notice Scheme, which is discussed above, involves the payment of a fine instead of being charged with a criminal offence, and is considered a component of the diversion program (ACT Health, 2004). In 2002, the option of diversion into treatment was legislated in the ACT. A maximum of 25 grams of cannabis can be possessed for the option of diversion, which consists of assessment and referral to treatment/education if necessary. A maximum of two diversion notices can be issued; young people as well as adults are eligible.

New South Wales: Possession of any amount of cannabis is a criminal offence in NSW (*Drug Misuse and Trafficking Act No. 226, 1985*). However, since 2000, NSW police officers have been able to issue a formal caution to adults in possession of up to 15 grams of cannabis, under the diversion program known as the Cannabis Cautioning Scheme (New South Wales Government, 2001). Only two cautions are able to be issued to the one person, and those with a prior drug or violent offence are excluded. Police officers can issue the cautions at their discretion and can choose to charge the individual instead. Those that receive a caution under the Cannabis Cautioning Scheme are provided with information on the legal and health aspects of cannabis use and are given a number to call for treatment information and referral (New South Wales Government, 2001). Since September 2001, on the second (and final) caution, an education session about cannabis use is mandatory.

In an evaluation of the scheme conducted by the New South Wales Bureau of Crime Statistics and Research (BOCSAR), over 9,000 people had been cautioned between

2000 and 2003 and only 3% of those cautioned went on to receive a second caution (Baker and Goh, 2004). Most of those receiving cautions were young males. Most of the cautions were for possession of a small amount of cannabis (three-quarters of those that received a caution were in possession of five grams or less) rather than for use or possession of equipment.

Problems revealed through the evaluation included operational ones such as: practical difficulty of issuing the caution in the field when bulky equipment (e.g. weighing scales) were necessary; variation in acceptance of the scheme between Local Area Commands; and a lack of knowledge about the second cautions on behalf of the police officers, leading to a lack of appropriate issuing of second cautions. Other problems were related to the outcome of the program. Very few individuals who received a caution actually called the drug information number provided with the caution (Alcohol and Drug Information Service, ADIS). Even when it was mandatory to do so (on the second caution), less than half of cautioned people called ADIS. This could be explained by the fact that many of the participants in the caution scheme did not believe they had a problem with cannabis and indeed may not have been dependent on the drug. The proportion of cautioned people calling ADIS is similar to the rate of treatment-seeking among cannabis users (Health Outcomes International, 2002).

There was some 'net-widening', in that individuals who would not previously have been dealt with in a formal manner by police received a cannabis caution. Aboriginal and Torres Strait Islander peoples were less likely to meet criteria for eligibility for the scheme than non-Indigenous individuals, which has in effect increased the over-representation of Aboriginal and Torres Strait Islander peoples in the courts, since they are being diverted away from the criminal justice system at a lower rate than non-Indigenous individuals (Baker and Goh, 2004).

On the positive side, the decrease in the number of charges for cannabis offences indicate that the scheme was successful in diverting minor cannabis offenders away from the criminal justice system (Baker and Goh, 2004). Additionally, the evaluation concluded that both the police and courts saved time and money as a result of the cannabis cautioning scheme.

For those under the age of 18 who have committed drug offences such as possessing cannabis, there is a range of options depending on the severity of the offence. A *warning* could be given, which involves the police officer recording the details of the offender. A *caution* involves the arrest of the young person, who is then given information about drug treatment or counselling services. Finally, for more serious offences, a *justice conference* may be held, which involves the young person explaining their actions to those who have been affected by them. A plan, which may include drug treatment, is then agreed upon and monitored (NSW Premier's Department, 2002).

Since 2000, a Youth Drug and Alcohol Court (YDAC) has been running in NSW. Young people who present in the Children's Court who are dependent on drugs or alcohol and who are not otherwise eligible for a caution or youth justice conference are eligible for the program. They must also be suitable for treatment and plead guilty to their offence. Clients appearing at the YDAC receive comprehensive case management to address not only their substance dependence but their health,

educational and housing needs. Two teams, the Youth Drug and Alcohol Court Team and the Joint Assessment and Review Team, administer the various aspects of the case management program.

An evaluation of the program showed that graduates of the program were more likely to reduce drug use and offending compared to those who terminated the program prematurely (Social Policy Research Centre, 2004). Most of the referrals and participants in the YDAC identified heroin as their main drug, followed by cannabis, although almost all participants were poly-drug users. Although general health was improved, this was not sustained. However, many participants showed improvement in terms of mental health. Partly on the basis of this evaluation, it was decided to expand the YDAC from Western Sydney to other areas of the city.

Another court-based diversion program is being piloted in 2005 in two rural locations (Bourke and Brewarrina). Known as the Intensive Court Supervision program, it provides mentoring and support through community volunteers to increase involvement in cultural activities, education, vocational training and sport, as well as addressing health or social problems.

A diversion program for Aboriginal and Torres Strait Islander peoples living in NSW is the Circle Sentencing program, which runs in some regional areas of NSW (including Dubbo, Nowra, Walgett, Brewarrina Bourke, Lismore, Armidale, Kempsey, and Western Sydney). Circle Sentencing involves the Aboriginal community in the sentencing process and aims to increase confidence in the criminal justice system among Aboriginal people, provide more appropriate sentences, and reduce recidivism. Victims are also included in the Circle Sentencing process.

Victoria: Like NSW, Victoria also has a Cannabis Cautioning Program, which has been running since 1998. Under the program, police officers are able to caution individuals in possession of up to 50 grams of cannabis. A maximum of two cautions are able to be given to the one person, and the caution notice includes referral, health and legal information relevant to cannabis (Australian Bureau of Criminal Intelligence, 2001). Individual police officers retain discretion to determine whether a caution is issued. Under IDDI funding, an optional education session entitled 'Cautious with Cannabis' is now also offered.

Minor cannabis offenders who are under the age of 18 can be diverted through the Victoria Police juvenile cautioning program. Another police diversion program, relating to the possession of small amounts of drugs other than cannabis, also runs in Victoria. However, rather than being given information and the option of an education session, diversion clients are required to undertake clinical assessment and enter drug treatment.

For young (aged 18 to 21 years) offenders facing charges in the Magistrates Court, Juvenile Justice Court advisers are available to provide support, including referral to drug treatment. The aim of the program is to address issues in order to minimise the likelihood of re-offending. The Children's Court Clinic Drug Program has been running since 2001 and receives funding from the IDDI. The program aims to reduce the risk that young children will become involved in further criminal activity by diverting them into treatment for their drug problem. A child is eligible if they: appear in the Criminal Division of the court; have an illicit drug use problem; and are

not under any other court order involving drug treatment. The child is assessed and a treatment plan proposed to the judge as a result of this assessment. If the judge, child and family all agree to the treatment plan, which could include counselling, outreach, withdrawal services or supported accommodation, the case is adjourned until the treatment program is completed under court monitoring. At the end of the treatment process, the court will hear a progress report and take this progress into account when determining an appropriate sentence.

Tasmania: As part of the Council of Australian Governments IDDI, Tasmania has a police diversion program in place that covers all illicit drugs including cannabis. This builds upon Tasmania's Cannabis Cautioning Program, introduced in July 1998, which enabled police offiers to issue a caution to first time offenders in possession of 50 grams or less of cannabis and incur no criminal proceedings.

Under the enhanced police diversion program introduced under the Council of Australian Governments IDDI, persons receiving a Cannabis Caution or a Drug Diversion for a minor cannabis offences do not incur criminal conviction, as long as the number of offences do not exceed three in a ten year span and the offender complies with the diversion conditions (Australian Bureau of Criminal Intelligence, 2001). Whilst individual police officers retain discretion to determine whether a Caution or Diversion Notice is issued as well as the level, it is generally the case that first-time cannabis offenders are cautioned and provided with referral, health and legal information; second time cannabis offenders are diverted to brief intervention; and third time cannabis offenders may be diverted to assessment and either treatment or brief intervention (Service Delivery Coordinating Committee, 2001).

Between February 2000 and March 2002, there were 1,594 diversions, and the vast majority (81%) of these were for first-time offences (Health Outcomes International, 2002). Approximately three-quarters of those receiving second or third cautions complied with the brief intervention or treatment. Most clients were young males. The type of interventions or treatments provided to most second and third-time offenders were assessment, information and education, and/or counselling (Health Outcomes International, 2002).

Diversion of minor cannabis offenders under the age of 18 is very similar to the adult diversion scheme, with a few additions such as the presence of parents (Health Outcomes International, 2002).

South Australia: As discussed, South Australia takes a 'prohibition with civil penalties' approach to minor cannabis offences, so the possession and use of the drug is generally dealt with by way of a monetary fine and the supply of educational materials.

An evaluation of cannabis offences under the Cannabis Expiation Notice (CEN) scheme in SA revealed that the number of cannabis offences increased following the introduction of the scheme (Christie, 1999). This 'net-widening' effect was explained by police procedures rather than an increase in the prevalence of cannabis use (Christie, 1999). Cannabis use overall did increase once the CEN was introduced, but similar increases occurred over the same time period (between 1985 and 1995) in states that did not change their approach to cannabis penalties (Donnelly et al., 1999). It was found to be more likely that the increase in offences was due to

police being more inclined to serve someone a CEN than they would have been to go through the process of charging someone with a criminal offence. It was also suggested that police may have chosen to serve a formal CEN to minor cannabis offenders rather than issue them with a caution, as they may have done previously (Christie, 1999).

Another study compared the experiences of minor cannabis offenders who were given a CEN in SA to that of cannabis offenders who received a criminal charge in Western Australia (when that state still took the prohibition with criminal penalties approach to minor cannabis offences). After taking potential confounders into account, the study found that the Western Australian (WA) sample were more likely than the SA sample to suffer negative employment, relationship, and accommodation consequences as a result of their cannabis charge (Lenton et al., 2000). The WA group were more likely to come into further contact with the criminal justice system than the SA group. No differences were found between the two groups in terms of subsequent drug use, which was unchanged following both the CEN and the criminal charge. This evaluation suggests that the CEN scheme was reducing the social harms associated with being charged with a criminal offence. Additionally, the scheme has been evaluated more cost-effective than the previous prohibition with criminal conviction approach (Brooks et al., 1999). However, it should be noted that the CEN scheme has not been without its problems. For example, the expiation rate has been low (Single et al., 1999). A study by Ali and colleagues (1999) found that some people were financially unable to pay the fine. The majority of those who did not pay the fine were not aware that that failure to pay the fine would result in a court conviction, which in turn leads to expensive court costs.

There is a police diversion scheme for illicit drug offenders (including cannabis offenders) aged between 14 and 18 years in South Australia (Health Outcomes International, 2002). On the first offence, the young cannabis offender is given educational material and notified to the Drug Diversion Line. On the second offence, a brief intervention is given. On the third offence, assessment and treatment is given. For those committing a fourth cannabis offence, they are dealt with by the criminal justice system. Younger cannabis offenders (aged 10 to 14 years) are immediately provided with assessment and treatment.

Western Australia: Before the introduction of the Cannabis Infringement Notice (CIN) in 2004, WA had a diversion program for minor cannabis offenders known as the Cannabis Cautioning Notice (CCN). The CCN was piloted from 1998 and became state-wide in 2000. Those participating in the CCN were required to attend an education session. As has already been discussed, since 2004 Western Australian police have been able to serve a CIN to those found in possession of a small amount of cannabis.

A group of researchers from the National Drug Research Institute at Curtin University and the Crime Research Centre at the University of WA, have published the first results from an evaluation of the Western Australian CIN scheme. The evaluation includes pre- and post- measures to determine the effect of the introduction of the CIN scheme compared with the previous CCN program. The evaluation consisted of seven sub-studies that investigated the impacts of the change on: cannabis use, attitudes and knowledge of the general public; cannabis use, attitudes, knowledge and involvement in the drug market of frequent cannabis

users; cannabis use and attitudes to the law and social impacts of apprehended offenders; comparison of data collected through the CIN scheme with that previously collected under the CCN program; attitudes of policy makers and law enforcement personnel on drug market, activities and practices; health effects, measured via drug treatment data, road injuries, psychosis and violence; and attitudes and knowledge of the changes among school students and teachers, and how the changes affect student cannabis use and school drug education (Lenton, 2005). Preliminary results (i.e. results of the studies conducted prior to the change), showed that the general public were receptive to the change and did not think that the change would increase cannabis use or availability. Indeed, the general public showed strong support for the scheme: 79% stated that the CIN scheme appeared to be *'a good idea'* and 70% believed the severity of its penalties to be *'about right'* (Fetherston and Lenton, 2005). The regular cannabis users interviewed before the change stated that they did not believe the change would have any effect on their level of cannabis use. A large proportion thought that they would cultivate one or two plants, but did not believe that this self-supply would allow users to distance themselves from the larger-scale cannabis market, and they did not think that the change would affect the broad cannabis market (Chanteloup et al., 2005). School students' use of cannabis was not expected to change under the new scheme (Lenton and Farringdon, 2005). The post-phase of this study is currently taking place, which will show whether these findings from the preliminary surveys and interviews prove to be the case, and will provide interesting comparisons of other relevant data about changes in extent of use, drug market, social harms and health effects (Lenton, 2005).

Those found in possession of small amounts of drugs other than cannabis for the first time are diverted into the compulsory assessment and treatment program. Participants must not have been involved in the diversion program before, or have any prior drug or violent offence convictions. If the participant does not comply with the treatment program devised during the assessment, then they face a summons for the original offence.

In the Children's Court, children that are charged with serious offences and have a drug use problem are dealt with in a similar manner to adults in the Drug Court described above.

Northern Territory: The NT Illicit Drug Pre Court Diversion Program (NTIDPCDP) approach specifically applies to first time offenders (adults and juveniles) with little or no past contact with the criminal justice system. The offenders offered diversion are usually in possession of a small amount of an illicit drug.

Adults in possession of a small quantities of cannabis can be issued with a Cannabis Expiation Notice, which entails a $200 infringement. All other illicit drugs can be addressed by the NTIDPCDP. Juveniles under the age of 18 in possession of cannabis and other illicit drugs are eligible, at the officer's discretion, for diversion to counselling, treatment and education services.

Queensland: Like NSW, possession of any amount of cannabis in Queensland is a criminal offence. However, since 2001, Queensland has been running a diversion program via the national IDDI, called the Police Diversion Program (PDP).

The PDP allows police to offer a person who has committed a minor cannabis offence (such as possession of no more than 50 grams of cannabis or possession of implements used to smoke cannabis) the option of attending a one to two hour education and assessment session, instead of being charged with the drug offence (Hales et al., 2004). The person must admit to the offence, must not have committed another indictable offence in conjunction with the minor cannabis offence, must not have been convicted with a violent offence, and must not have already been offered the diversion option. Unlike cannabis diversionary programs running in other states and territories, under the Queensland PDP, police *must* offer the diversion. This has meant that Queensland has recorded a greater number of referrals than other Australian jurisdictions, where police officers use their discretion to offer diversion (Hales et al., 2004). Additionally, no other drugs are included in the definition of a 'minor drugs offence'. If the person attending the diversion program is assessed as being dependent on cannabis or any other drug, they are referred onto appropriate treatment, but uptake of this further treatment is voluntary.

A recent evaluation showed that there has been a 28% decrease in minor illicit drug possession charges being dealt with by the courts since the PDP has been operating (Hales et al., 2004). Compliance with the assessment and education session varied with age (aged 16 to 20 were the age group with the lowest compliance rate), cultural status (68% of Aboriginal and Torres Strait Islander peoples complied with the session, compared with 83% of non-Indigenous people), and the lag between referral from police and the session.

Unsurprisingly, cannabis was the most common drug (with the exception of alcohol) used by those that participated in the PDP. One in five participants were regular users of amphetamine, while the use of heroin was rare (5%). Following diversion, self-reported regular use of cannabis decreased, but this decrease was not statistically significant. A concurrent qualitative study also suggested that cannabis use decreased. All other measures of drug use remained stable.

A recent study has found that most (60%) people diverted are actually dependent on cannabis and self-reported health of the participants was found to be worse than normative Australian data on the same measures (Feeney et al., 2005). According to Hales and colleagues (2004), physical and mental health improved over time amongst those who were diverted, and social functioning remained unchanged. The vast majority of participants found the assessment to be positive; in particular the information provided on the harms associated with cannabis use and the safe use of the drug were perceived as useful. The evaluators recommended that the PDP continue, with some changes such as ongoing data collection and monitoring, slight changes to the eligibility criteria, and creating more efficient processes (Hales et al., 2004).

The PDP applies to children as well as adults. The Illicit Drug Court Diversion Program is also being piloted in the Children's Court. Court proceedings are adjourned while the child attends the assessment and education session, and no conviction is recorded if the session is attended and completed.

Other cannabis policies and programs

Diversion programs were presented in detail since they are often specific to cannabis. They are also important to mention in the context of the legislative status of cannabis in various states and territories. Those states that do not have the option to issue a small fine to individuals who have committed a minor cannabis-related offence do, however, have the option to divert the individual away from the criminal justice system under the IDDI. Obviously, there is a vast array of policies and programs (other than diversion) across Australia that aims to respond to the issue of cannabis-related harm. It is beyond the scope of this monograph to review all of these programs, which range from public education programs, to early intervention programs, to school-based drug education programs, to cannabis treatment provision. The reader is directed to the monograph *The prevention of substance use, risk and harm in Australia: A review of the evidence*, which provides a comprehensive overview of the evidence related to these various approaches to the prevention of drug-related harm, including the application of prevention policy and strategy in Australia (Loxley et al., 2004).

Serious cannabis offences

Legislation pertaining to more serious cannabis offences, such as trafficking, also differs between the federal level and between each state and territory. It should be noted that work is currently being undertaken by some jurisdictions to ensure that legislation in relation to commercial and trafficable quantities of cannabis is consistent with the Model Criminal Code, which is a project that aims to develop uniform national criminal laws (Model Criminal Code Officers Committee, 1998). Table 4 presents penalties for cannabis offences at the border, and Table 5 presents penalties for serious cannabis offences within each jurisdiction, as well as the penalties outlined in the section on serious drug offences in the Model Criminal Code.

Table 4. Commonwealth penalties for cannabis offences at the border

Import/Export	Less than a Marketable Quantity	Marketable Quantity	Commercial Quantity
Cannabis	**Less than 25 kilograms** If intention to sell - Maximum penalty 10 years imprisonment and/or 2000 penalty units (which currently equates to $220,000). If for personal use - Maximum penalty 2 years imprisonment and/or 400 penalty units (which currently equates to $44,000).	25 kilograms and over – less than 100 kilograms Maximum penalty: 25 years imprisonment and/or 5000 penalty units (which currently equates to $550,000).	100 kilograms and above Maximum penalty: life imprisonment and/or 7500 penalty units (which currently equates to $825,000).
Cannabis Resin	**Less than 20 grams** If intention to sell - Maximum penalty 10 years imprisonment and/or 2000 penalty units (which currently equates to $220,000). If for personal use - Maximum penalty 2 years imprisonment and/or 400 penalty units (which currently equates to $44,000)	20 grams and over – less than 50 kilograms Maximum penalty: 25 years imprisonment and/or 5000 penalty units (which currently equates to $550,000).	50 kilograms and above Maximum penalty: life imprisonment and/or 7500 penalty units (which currently equates to $825,000).
Cannabinoid (oil)	**Less than 2 grams** If intention to sell - Maximum penalty 10 years imprisonment and/or 2000 penalty units (which currently equates to $220,000). If for personal use - Maximum penalty 2 years imprisonment and/or 400 penalty units (which currently equates to $44,000).	2 grams and over – less than 2 kilograms Maximum penalty: 25 years imprisonment and/or 5000 penalty units (which currently equates to $550,000).	2 kilograms and above Maximum penalty: life imprisonment and/or 7500 penalty units (which currently equates to $825,000).
Cannabis Plant (growing)	**Less than 25 kilograms or 100 plants** If intention to sell - Maximum penalty 10 years imprisonment and/or 2000 penalty units (which currently equates to $220,000). If for personal use - Maximum penalty 2 years imprisonment and/or 400 penalty units (which currently equates to $44,000).	25 kilograms or 100 plants and over – less than 250 kilograms or 1,000 plants Maximum penalty: 25 years imprisonment and/or 5000 penalty units (which currently equates to $550,000).	250 kilograms and above or 1000 plants or more Maximum penalty: life imprisonment and/or 7500 penalty units (which currently equates to $825,000).

* Note that these penalties come into effect upon commencement of Schedule 1 of the *Law and Justice Amendment (Serious Drug Offences and Other Measures) Act 2005*, on 6 December 2005.

Table 5. Penalties for cannabis offences in Australian states and territories

	Possession – Small quantity	Possession or supply of more than small quantity.	Traffickable quantity (supply)	Indictable quantity (heard in District Court)	Commercial quantity	Large commercial quantity
ACT[a]						
Cannabis leaf	25 grams	>25 grams	300 grams	–	25,000 grams	125,000 grams
Cannabis resin	Excluded	–	20 grams	–	25,000 grams	50,000 grams
Cannabis oil	Excluded	–	2 grams	–	1,000 grams	2,000 grams
Cannabis plant	2 plants (non–hydroponic)	>2 plants	10 plants	–	100 plants	1000 plants
Maximum penalty	$100 (SCON) or diversion into treatment	$5,000 (leaf) or $20,000 (plant) &/or 2 years	$100,000 &/ or 10 years	–	$250,000 &/ or 25 years	Life
NSW[b]						
cannabis leaf	30 grams	–	300 grams	1,000 grams	25,000 grams	100,000 grams
Cannabis resin	5 grams	–	30 grams	90 grams	2,500 grams	10,000 grams
Cannabis oil	2 grams	–	5 grams	10 grams	500 grams	2,000 grams
THC	1 grams	–	3 grams	5 grams	500 grams	2,000 grams
Cannabis plant	5 plants	–	–	50 plants	250 plants	1000 plants
Maximum penalty	$10,000 &/or 2 years	–	$110,000 &/ or 2 years	$200,000 &/ or 10 years	$350,000 &/ or 15 years	$500,000 &/ or 20 years
Victoria[c]						
Cannabis	50 grams	–	250 grams	–	25,000 grams	250,000 grams
THC	1 gram	–	25 grams	–	1,000 grams pure or 10,000 grams mixed	3,000 grams pure or 25,000 grams mixed
Cannabis plant	Excluded	–	10 plants	–	100 plants	1000 plants
Maximum penalty	$500	–	15 years	–	25 years	$500,000 &/or life
Tasmania[d]						
Cannabis leaf	Not defined	–	1,000 grams	–	–	–
Cannabis resin	Not defined	–	25 grams	–	–	–
Cannabis oil	Not defined	–	25 grams	–	–	–
Cannabis plants	Not defined	–	20 plants	–	–	–
Penalty	$5,000 units or 2 years	–	21 years	–	–	–
South Australia[e]						
Cannabis leaf	100 grams	–	100 grams	2,000 grams	10,000 grams	–
Cannabis resin	20 grams	–	20 grams	500 grams	2,500 grams	–
Cannabis oil	Excluded	–	2 grams	75 grams	300 grams	–
Cannabis plant	1 plant	–	10 plants	20 plants	100 plants	–
Penalty	$50–$150	–	$2,000 &/or 2 years	$50,000 &/ or 10 years	$500,000 &/ or 25 years	–

Western Australia[f]						
Cannabis leaf	30 grams	–	100 grams	500 grams	3,000 grams	–
Cannabis cigarettes	–	–	80 cigarettes	400 cigarettes	Excluded	–
Cannabis resin	Excluded	–	20 grams	40 grams	100 grams	–
Cannabis plant	2 plants	–	10 plants	100 plants	250 plants	–
Penalty	$50–$150	–	$20,000 &/or 10 years		$100,000 &/ or 25 years	–
Northern Territory[g]						
Cannabis plant material	< 50 grams	–	50 grams	–	500 grams	–
Cannabis resin	<10 grams	–	10 grams	–	100 grams	–
Cannabis oil	<1 gram	–	1 grams	–	25 grams	–
Cannabis seed	<10 grams	–	10 grams	–	100 grams	–
Cannabis plant	2 plants	3–4 plants	5–19 plants	–	20 or more plants	–
Penalty	$200	$5,000 or 2 years if possession occurs in a public place, otherwise $2,000	$10,000 or 5 years	–	14 years	–
Queensland[h]						
Cannabis leaf	–	–	500 grams	–	–	–
Cannabis plant	–	–	500 grams or 100 plants	–	–	–
Penalty	–	–	20 years	–	–	–
Model Criminal Code[i]						
Cannabis	–	–	300 grams	–	2,500 grams	50,000 grams
Cannabis plant	–	–	5 plants	–	50 plants	1,000 plants
Penalty	–	–	10 years	–	20 years	Life

Sources:

[a] Drugs of Dependence Act 1989; Criminal Code Regulation 2005; Criminal Code 2002, Chapter 6; Personal communication with ACT Police

[b] Drug Misuse and Trafficking Act 1985

[c] Drugs, Poisons and Controlled Substances Act 1981

[d] Misuse of Drugs Act 2001

[e] Controlled Substances Act 1984; Controlled Substances (expiation of simple cannabis offences) regulations 2002

[f] Misuse of Drugs Act 1981; Cannabis Control Act 2003

[g] Misuse of Drugs Act (2004)

[h] Drugs Misuse Act 1986; Drugs Misuse Regulation 1987

[I] Model Criminal Code (Model Criminal Code Officers Committee, 1998)

International cannabis policies and legislation

Most countries, including Australia, have endorsed the United Nations conventions on drug control[5], which restrict the use of certain drugs, including cannabis, to medicinal and scientific purposes (United Nations Office on Drugs and Crime, 2004). As previously mentioned, on average, cannabis use has increased for the last decade across the globe, most significantly between 2000 and 2002 (United Nations Office on Drugs and Crime, 2004). The policy and legislation with respect to cannabis differ from country to country. Obviously there is not room to present a discussion of every country's laws and policy in this monograph; a few countries were selected that provide interesting examples of the different approaches that exist internationally for dealing with the use of cannabis. It should be noted that the presentation of these countries' cannabis policy and legislation is simply to give the reader a sense of the current international context. Direct and simple comparison of one country's policy and legislation with another is problematic, given political, cultural and social differences. However, understanding other country's broad approaches helps to contextualise Australian policies.

New Zealand

New Zealand's most recent national drug policy has as its primary goal to minimise the harm caused by drugs (licit and illicit) at both the community and individual levels (Ministry of Health, 1998). Demand reduction and supply reduction are the two main strategies used by the New Zealand Government to minimise the harm associated with drug use.

Cannabis is the most widely used illicit drug in New Zealand. Most cannabis is grown outdoors, but artificial cultivation is becoming more popular (Ministry of Health, 1998). Under the *Misuse of Drugs Act 1975*, the less potent form of cannabis (i.e. marijuana) is classified as a Class C drug, which indicates that cannabis is seen as a drug that poses a 'moderate risk' of harm as opposed to the 'high risk' Class B drugs or the 'very high risk' Class A drugs. Hash and hash oil are defined as Class B drugs. Penalties for possession or supply vary with the class of the drug. For example, supply of hash carries a maximum penalty of 14 years imprisonment, whereas the maximum penalty for supply of marijuana is eight years in prison (Health Committee, 2003). However, the maximum penalty for possession for personal use is the same for all forms of cannabis (three years in prison and/or $500 fine).

In 1998 a Parliamentary Committee conducted an inquiry into cannabis use in New Zealand, with a particular focus on the mental health effects of cannabis. One of the recommendations of this inquiry was to review strategies relating to cannabis and to examine the legal status of the drug. This was undertaken by the next two Parliamentary Health Committees and reported on in 2003 (Health Committee, 2003). The Committee made 23 recommendations to the government, including the reconsideration of the classification of cannabis, and the support for the prescription of tested cannabis products for medicinal purposes. Other recommendations included: setting up a diversion program for minor cannabis offenders across

5 The United Nations Single Convention on Narcotic Drugs of 1961, the United Nations Convention on Psychotropic Substances of 1971 (does not cover cannabis) and the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988.

New Zealand; research into the potency of artificially-grown cannabis; testing for cannabis-related driving impairment; investigation of the link between cannabis and suicide; and various recommendations regarding the prevention and treatment of cannabis-related problems for young people and Indigenous New Zealanders.

At present, New Zealand law allows for the prescription of cannabis products for medicinal purposes provided the required approvals are obtained under the *Medicines Act 1981*. However, in the government's response to the inquiry report, it is pointed out that home-grown cannabis would be unlikely to meet the requirements of the Medicines Act, but it is conceded that a pharmaceutical form of cannabis might. The government noted that a clinical trial of such a cannabis product would be required but no applications had been received to conduct this at the time of the response (New Zealand Government, 2003).

United States of America

The White House has recently released an update of its National Drug Control Strategy. The United States of America's (USA) drug strategy has three priorities: "stopping drug use before it starts, healing America's drug users, and disrupting the market" (The White House, 2005). The overarching goal of the strategy is to reduce drug use.

Since the 1980s, the USA at a federal level has taken a 'zero tolerance' stance on illicit drugs, including cannabis (Hall and Pacula, 2003). However, while possession of any amount of cannabis is a criminal offence at the federal level – with offenders facing substantial fines and the possibility of imprisonment – in many instances at the state level the possession of small amounts of cannabis has been decriminalised, meaning that although the offence is still illegal, it does not attract a criminal charge (Hall and Pacula, 2003). The other major discrepancy between state and federal cannabis policy in the USA pertains to the medicinal use of marijuana. The Federal Government continues to refuse to recognise the medicinal use of marijuana while many states, such as California, have enacted legislation that allows for the use of the drug for medicinal purposes (ImpacTeen Illicit Drug Team, 2002).

As of the beginning of 2000, 24 states in the USA have enacted a law that allows for the medicinal use of cannabis (ImpacTeen Illicit Drug Team, 2002). Although it is commonly recognised that there are 12 states[6] that have decriminalised the possession of small amounts of cannabis, a recent evaluation of state legislation finds that some of these states have not in fact decriminalised cannabis possession, while other supposedly 'non-decriminalised' states have (Pacula et al., 2003). According to the evaluation, there are actually 15 states[7] that have decriminalised the possession of small amounts of cannabis. Additionally, a further 13 states run diversion programs that allow the criminal record pertaining to the cannabis offence to be erased if treatment, education or community service is completed (Hall and Pacula, 2003). Complicating the picture further, there are some significant differences between the policy of decriminalised states, such as the definition of a 'small' amount of cannabis, and the applicability of reduced penalties to repeat offenders (Pacula et al., 2003).

6 These states are: Oregon, Colorado, Alaska, Ohio, California, Maine, Minnesota, Mississippi, New York, North Carolina, Nebraska, and Arizona.

7 These states are: Oregon, Colorado, Ohio, Maine, Minnesota, Mississippi, New York, Nebraska, Connecticut, Louisiana, Massachusetts, New Jersey, Vermont, Wisconsin, and West Virginia.

In the USA, federal policy and state policy are in direct conflict with each other when it comes to cannabis; the same cannabis offence could be penalised very differently depending on whether the offender was tried in a state or federal court. Since the 1970s, the cannabis regulation situation in the USA has been paradoxical in that the states are gradually liberalising their cannabis policy while the Federal Government has become more vigorous in its arrest and prosecution of cannabis offenders, as part of the country's so-called 'war on drugs' (Reinarman et al., 2004).

Canada

Canada's National Drug Strategy, which was renewed in 2003, aims to "reduce the harm associated with alcohol and other drugs to individuals, families, and communities" (Government of Canada, 1998, p. 4). The Canadian Government views substance abuse as primarily a health issue rather than a law enforcement issue, and seeks to reduce harm associated with substance use with a balance of demand reduction and supply reduction strategies.

Canada is now the only country that allows the use of naturally-grown cannabis for medicinal purposes, while also allowing the prescription of Sativex®, the pharmaceutical cannabis extract. In 1999 Canada introduced a scheme whereby individuals could obtain a permit to possess and grow cannabis for medicinal purposes, and this scheme was outlined in regulations introduced in 2001 (Kisely, 2005). In 2003, Health Canada began providing cannabis to those who are registered to use it for medicinal purposes (Johns, 2004). In 2005, the use of Sativex for reducing neuropathic pain associated with multiple sclerosis was approved.

Despite Canada's stance with respect to the medicinal use of cannabis, in terms of penalties for personal use Canada is yet to initiate reform in this area. While other countries including Australia and the United States have jurisdictions that have decriminalised the use and possession of small amounts of cannabis, Canada still has all cannabis possession as a criminal offence, unless the cannabis is to be used for medicinal purposes. It should be noted that diversion programs operate in Canada, so that people found in possession of cannabis may be diverted away from the criminal justice system into health services (Kisely, 2005). A recent Senate inquiry in Canada recommended that legislation be amended to contain a *criminal exemption scheme* whereby production and sale of cannabis would be licensed (Senate Special Committee on Illegal Drugs, 2002).

United Kingdom

The United Kingdom (UK) Drug Strategy was updated in 2002. The drug strategy aims to reduce the harm drugs cause to society through prevention, education, harm minimisation, treatment and effective policing (Home Office, 2002).

Cannabis is the most widely used illicit drug in the UK and statistics on the use of cannabis in the UK over the last two decades have shown a marked increase (Advisory Council on the Misuse of Drugs, 2002). Arrests for cannabis-related offences also rose during the 1990s, but concurrently public opinion became more tolerant of the drug (Warburton et al., 2005).

In November 2005, the UK Government allowed for the importation of Sativex® from Canada for prescription to individual patients, subject to the physician obtaining a licence to do so. Full regulatory approval is awaiting the results of further clinical trials of the cannabis-based medicine. Cannabis remains a controlled drug, and possession of any amount of the drug is a criminal offence. In 2001 the Advisory Council on the Misuse of Drugs reviewed the classification of cannabis under the *Misuse of Drugs Act 1971* and recommended that it be changed from a 'Class B' drug, an intermediate category that includes amphetamines and barbiturates, to the category of least harmful 'Class C' drugs, which includes benzodiazepines and steroids (Advisory Council on the Misuse of Drugs, 2002)[8]. The main reason behind this change is to reflect the government's view that "cannabis is unquestionably harmful but does not destroy lives in the same way as heroin, crack, cocaine and ecstasy" (Home Office, 2002). The change was accepted and came into effect in January 2004 (Warburton et al., 2005).

Before the reclassification of cannabis, Class C drug possession offences were not 'arrestable' offences. However, this was changed, so that police could still arrest an individual for cannabis possession once it became a Class C drug under 'special circumstances' (Warburton et al., 2005). These circumstances include smoking cannabis in public, multiple instances of cannabis possession, if public order is threatened or if possession takes place in the vicinity of premises used by children (Association of Chief Police Officers of England, 2003). In most cases, the offender would be given a formal on-the-spot warning. For those younger than 18 years old, police officers are still required to make an arrest for cannabis possession under the *Crime and Disorder Act 1998*. However, the act specifies that the young person will be given a reprimand or a warning on their first cannabis offence if the constable believes that it is in the public interest not to charge the person (*Crime and Disorder Act 1998*).

The classification change also means that the maximum penalty for possessing cannabis changes from five to two years incarceration. However, the UK Government also changed the penalties for trafficking Class C drugs to be in line with the Class B drugs, so, effectively, the maximum prison sentence for trafficking cannabis remains unchanged at 14 years. It should be noted that in March 2004 the Home Office requested the government's drugs advisory committee to reassess their position on cannabis and its reclassification given emerging evidence on the link between cannabis use and psychosis, and the increased prevalence of highly potent cannabis (Home Office, 2005). The advisory committee recommended that the classification of cannabis remain as a Class C drug.

The Netherlands

Drug policy in The Netherlands is focused on preserving the health of drug users and protecting the individuals that are affected by others' drug use, as well the community as a whole. Demand and supply reduction are also aims of The Netherlands' drug policy (Ministry of Health Welfare and Sport, 1997).

The regulation of cannabis in The Netherlands is unique. In 1976 the major drug act (the Opium Act) was amended to distinguish between 'drugs presenting unacceptable

8 Note that cannabis oil was originally a Class A drug, but has been reclassified as a Class C drug along with cannabis resin and cannabis leaf (Warburton et al., 2005).

risks' such as heroin and amphetamines, and 'cannabis products', which include marijuana and hashish (McDonald et al., 1994; Ministry of Health Welfare and Sport, 1997). Dutch drug policy employs the 'expediency principle' for prosecutions, which means that prosecution for certain offences do not have to be pursued if it is in the public interest not to (Ministry of Health Welfare and Sport, 1997). The Dutch Government applies this principle to the possession of small amounts of drugs including cannabis. More controversial is the application of the expediency principle to the sale of cannabis in coffee shops. The purpose of this particular application is to separate the markets of cannabis and the so-called 'hard drugs' which fall under the Opium Act's definition of 'drugs presenting unacceptable risks'.

The situation in The Netherlands is unusual because although the sale and possession of cannabis is illegal, these offences are not prosecuted in practice unless sellers of cannabis are: selling hard drugs; selling more than five grams of cannabis per person; advertising their business; selling to minors; or causing a nuisance (Ministry of Health Welfare and Sport, 1997). It should be noted that harsh penalties do exist for trafficking cannabis in The Netherlands (Ministry of Health Welfare and Sport, 1997).

Elsewhere in Europe

Two further countries in Europe provide an interesting contrast with respect to drug policy: Sweden and Portugal. After experimenting with liberal drug laws during the 1960s, Swedish drug laws are now among the strictest in the world (Hall and Pacula, 2003). The stated aim of drug policy in Sweden is to have a drug-free society (Swedish National Drug Policy Coordinator, 2004). However, the emphasis is on rehabilitating the drug user, rather than incarcerating them. Treatment in Sweden is often coerced, and it is legal to have compulsory treatment (Hall and Pacula, 2003). Cannabis is seen very much as a gateway into the use of other illicit substances, so one of the key strategies in Swedish drug policy is to prevent the uptake of experimental cannabis use (Swedish National Drug Policy Coordinator, 2004). The other key areas are providing treatment for those who already have a substance use problem and to reduce the supply of cannabis use (Hall and Pacula, 2003).

In the context of a national drug strategy based on harm reduction, Portugal decriminalised the use and simple possession of cannabis as well as other illicit drugs in 2001 (Hall and Pacula, 2003). Those found in possession of illegal drugs are brought before a special committee that determines the penalty. The aim of this was to keep substance users away from the criminal justice system and reduce the harms to the individual substance user.

Summary

As pointed out earlier, it is beyond the scope of this monograph to present cannabis legislation and policy of every country, so a few countries have been chosen to give the reader a sense of context for Australia's cannabis legislation and policy.

Like Australia, New Zealand, Canada, the UK and Portugal use the principle of harm minimisation as the basis for their drug policy, which acknowledges that drug use will occur. In contrast, Sweden aims for a drug-free society, and has coerced treatment for drug users. The USA has a zero tolerance approach to cannabis federally.

In New Zealand and Canada, minor cannabis offences have not been decriminalised as has happened in certain states and territories in Australia. Despite the tough stance taken on cannabis at the federal level in the USA, cannabis has been decriminalised in certain states. Portugal has decriminalised minor offences involving not only cannabis, but all illicit substances. The Netherlands has, in practice, legalised the use and sale of small amounts of cannabis.

The UK and New Zealand have indicated a willingness to allow for the medicinal use of cannabis. Canada and The Netherlands allow for the medicinal use of cannabis. Federally, the USA does not allow for medicinal use of cannabis, but some states have gone against this by introducing legislation for medicinal cannabis.

When it comes to cannabis legislation, of the countries reviewed in this section, Australia seems to sit somewhere in the middle alongside New Zealand and the UK, with the restrictive Swedish and Federal USA Governments on one side, and the liberal Netherlands, Portuguese, and Canadian Governments on the other.

SUMMARY AND CONCLUSIONS

The main purpose of this monograph was to overview the cannabis situation in Australia, in part to provide an up-to-date context for the recently-endorsed *National Cannabis Strategy 2006-2009,* although not part of the Strategy itself. This monograph has provided an overview of the use and supply of cannabis in Australia, the harms associated with cannabis, and cannabis-related policy and legislation.

Cannabis the drug is derived from the plant *cannabis sativa*, and is used either in the form of dried leaves and buds ('marijuana') or as an extracted resin ('hashish' or 'hash') or oil ('hash oil'). Hash and hash oil use is rare in Australia. Whilst cannabis can be added to food and eaten, most people smoke marijuana in a 'joint' or a water pipe. Although the cannabis used presently may be slightly more potent overall than the cannabis used in the 1970s, there are a number of sources of variation in potency that can affect its strength when used.

Cannabis has been used for its medicinal properties around the world for centuries, but it was not until the late 20th century that cannabis was used widely in Western countries, including Australia. The use of cannabis is widespread, with about one-third of Australians over the age of 14 having tried the drug, and about one in ten having used it in the past year. The past-year prevalence of use is similar to other Western countries, such as the USA, the UK and New Zealand. Use of cannabis is highest among those aged 20 to 29. Young people and adolescents use cannabis more than any other illicit drug, with past year prevalence of use being approximately 20% for adolescents attending school. Use of cannabis among Aboriginal and Torres Strait Islander peoples is higher than the general population, and this high rate of use has been increasing recently in remote communities.

The factors that are thought to lead to harmful use of cannabis are likely to be the same as those that lead to the harmful use of other substances. Known as the social determinants of drug use, these risk and protective factors are present from an early age and require a range of early intervention and preventative programs to address them. Although cannabis use has decreased recently in Australia, the demand for treatment for cannabis-related problems has increased. Cannabis use is associated with the use of other drugs, although it is not clear what the mechanism behind this association is.

Supply-side indicators suggest that cannabis availability and price has remained relatively stable over the past few years. Cannabis accounts for the majority of drug-related arrests, and those who are arrested for a cannabis-related offence are usually charged with a possession or use offence rather than a supply (dealing) offence. Most cannabis in Australia is domestically produced, either in large outdoor crops, or grown hydroponically in residences.

Although cannabis does not directly cause death from overdose in humans, there are some significant harms associated with cannabis use, particularly for those who are vulnerable and/or who use heavily. The physical harms of cannabis include an increased risk of accident when driving under the influence of cannabis, respiratory problems when cannabis is smoked, and cardiovascular problems in those who are vulnerable. Cannabis intoxication can cause cognitive deficits such as poorer memory

and attentional problems (as might any intoxicant), but there is not enough evidence to conclude that these deficits persist after cannabis use is stopped for at least a few weeks. Cannabis represents one of many risk factors for the development of psychotic disorders such as schizophrenia, such that heavy cannabis use may trigger psychosis in those who are predisposed to suffering from such disorders. There is some evidence that cannabis use is associated with later development of depression or depressive symptoms, but more research is needed. There is not a lot of evidence for a causal relationship between cannabis use and anxiety disorders. Although regular cannabis use is commonly said to be associated with poor motivation, there is no convincing research supporting this view. The social harms associated with cannabis use include: poor family relationships, increased involvement in crime, less financial stability, and potentially poorer educational and occupational performance. These may not be a direct result of cannabis use per se, but could be due to an underlying cause that leads to both problematic cannabis use and poor social outcomes.

Cannabis dependence is characterised by tolerance, withdrawal and an inability to control or stop use so that it causes physical, social or economic problems. The past-year prevalence of cannabis dependence is approximately 1.5%, and is associated with a greater risk of experiencing the problems outlined above. Research suggests that psychological therapies such as cognitive-behavioural therapy and Motivational Interviewing are effective in treating cannabis dependence, but further work is needed in this area.

Groups that have been identified as being at greater risk of cannabis dependence and other problems associated with cannabis use are: young people (due to the association between early initiation into substance use and subsequent problems such as dependence, and the risks associated with using cannabis at a developmentally vulnerable age); Aboriginal and Torres Strait Islander peoples (due to high rates of use coupled with long-standing risk factors for poor health and social well-being); and people with mental health problems (due to the risk of cannabis exacerbating existing mental health issues). The cost of cannabis to Australian society is significant given its high prevalence of use; however, it should be noted that heroin, alcohol and tobacco represent a greater burden on Australia.

Cannabis is illegal in all states and territories. All states and territories in Australia have schemes that divert minor cannabis offenders into health education and treatment, and/or allow for fines to be imposed for the possession of small quantities of cannabis, in recognition of the potentially adverse social impact a criminal record can have for someone who would not otherwise come into contact with the criminal justice system. Penalties for the sale, cultivation or trafficking of large amounts of cannabis are, however, significant across all jurisdictions.

Australia has had a national drug policy based on the minimisation of drug-related harm since the mid-1980s, through a balance of demand reduction, supply reduction and harm reduction strategies. Recently, the National Cannabis Strategy 2006-2009 was endorsed, which is the first of its kind in Australia, and is consistent with the priority areas of the National Drug Strategy 2004-2009. It aims to address many of the harms identified in this monograph, through responses that are focused on: informing the community of accurate information about cannabis; preventing use, particularly amongst those who are in at-risk groups; preventing problems associated with use by preventing occasional users from increasing use to levels which

place them at greater risk of dependence and harms; and responding to problems when they do occur, by providing effective treatment. Further research to assist in elucidating the harms associated with cannabis, where there are unanswered questions, is also recommended in the Strategy. The Strategy can be accessed via the National Drug Strategy web site: http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/cannabis-strategy.

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