

THE BECKLEY FOUNDATION  
DRUG POLICY PROGRAMME

A KCA REPORT



CANNABIS AND MENTAL HEALTH:  
RESPONSES TO THE EMERGING  
EVIDENCE

*Neil Hunt, Simon Lenton, John Witton*

APRIL 2006

REPORT EIGHT





# CANNABIS AND MENTAL HEALTH: Responses to the Emerging Evidence

Neil Hunt (KCA, UK) Simon Lenton (National Drug Research Institute, Australia) John Witton (National Addiction Centre, London)

The Beckley Foundation Drug Policy Programme (BFDPP) is a new initiative dedicated to providing a rigorous, independent review of the effectiveness of national and international drug policies. The aim of this programme of research and analysis is to assemble and disseminate material that supports the rational consideration of complex drug policy issues, and leads to a more effective management of the widespread use of psychoactive substances in the future.

## SUMMARY

According to United Nations figures, cannabis is the most widely used of the psychoactive substances that are prohibited under the UN Drug Control Conventions. Unlike heroin and cocaine, which are produced in relatively concentrated areas of the world, and whose levels of consumption vary widely across different countries and regions, cannabis is now widely cultivated and consumed across all continents. Furthermore, the use of cannabis or its derivatives is embedded within many traditional cultures, or has become culturally accepted as a drug of choice by a significant proportion of the population in many countries. Not readily associated with the most visible harms arising from drug use, cannabis is seen by many as a relatively benign drug. Indeed, many use it for its medical, therapeutic, social and spiritual benefits. However, there is increasing apprehension about its possible role in triggering or exacerbating mental health problems, or of inhibiting young people's emotional or social development. Cannabis therefore presents unique challenges to the international control system that need to be confronted by policy makers – indeed, the UN Drugs Control Chief Antonio Maria Costa acknowledged, in his closing speech at the 2006 Commission on Narcotic Drugs, that cannabis represents the main weak point in the system that he oversees.

## INTRODUCTION

The United Nations recently estimated that 160.9 million people aged 15-64 used cannabis during the year 2003/4 (United Nations Office on Drugs and Crime 2005). In most countries, cannabis is both the most commonly reported illicit drug and the earliest that people use. Such widespread use is important because our understanding of the risks and harms that can accompany its use are progressively improving and, because early use of any drug across the life-course tends to be associated with higher risks.

The acute (short-term) and chronic (long-term) effects of cannabis have been summarised by Hall *et al.* (2000: XXV) as follows:

### **Acute effects**

*The major acute adverse psychological and health effects of cannabis intoxication are:*

- anxiety, dysphoria, panic and paranoia, especially in naive users;
- cognitive impairment, especially of attention and memory;
- psychomotor impairment, and possibly an increased risk of accident if an intoxicated person attempts to drive a motor vehicle;
- an increased risk of experiencing psychotic symptoms among those who are vulnerable because of personal or family history of psychosis; and,
- an increased risk of low birth weight babies if cannabis is used during pregnancy.

### **Chronic effects**

*The most probable health and psychological effects of chronic heavy cannabis use appear to be:*

- respiratory diseases associated with smoking as the method of administration, such as chronic bronchitis, and the occurrence of histopathological changes that may be precursors to the development of malignancy;
- an increased risk of cancers of the aerodigestive tract, i.e. oral cavity, pharynx, and oesophagus; and,
- development of a cannabis dependence syndrome, characterised by an inability to abstain from or to control cannabis use.

*The following possible adverse effects of chronic, heavy cannabis use remain to be confirmed by further research:*

- a decline in occupational performance marked by underachievement in adults in occupations requiring high level cognitive skills, and impaired educational attainment in adolescents; and,
- subtle forms of cognitive impairment, most particularly of attention and memory, which persist while the user remains chronically intoxicated, and may or may not be reversed by prolonged abstinence from cannabis.

Alongside our developing understanding of the impact of cannabis on health and well-being, there are also some indications that the types of cannabis available and patterns in its consumption may be changing. Prominent among these concerns are suggestions that the potency of cannabis is increasing, with the implication that contemporary cannabis consumption now carries greater risks than it has done historically.

Furthermore, a number of recent additions to the literature have raised particular concerns about the impact of cannabis on mental health and the possibility that this may disproportionately affect young people; reinvigorating debates about the extent of risks and harms of cannabis' overall use and how we should best respond. The UK government's referral of the question of cannabis's classification under the Misuse of Drugs Act (1971) back to its Advisory Council on the Misuse of Drugs (ACMD) in 2005 – shortly after its classification was downgraded to Class C - is illustrative of such debates (See Trace *et al.* 2004 for an account of the original process). Accordingly, it is of some note that in January 2006 the Home Secretary decided to retain cannabis in Class C of the UK's Misuse of Drugs Act, in keeping with the recommendation of the ACMD's most recent review of this evidence (Advisory Council on the Misuse of Drugs 2005).

In an effort to make sense of the latest evidence and how to respond most effectively, this briefing summarises recent learning concerning:

- The extent of cannabis use among young people;
- The evidence concerning changes in its strength and availability;
- The relationship between cannabis use and serious and enduring mental health problems (psychosis); and,
- The options for controlling and responding to cannabis use.

## YOUNG PEOPLE'S USE OF CANNABIS AROUND THE WORLD

Not only is cannabis the most widely used illicit drug in the world, but its use is generally increasing. Among adults, in some countries where cannabis use has been high - the USA and Australia - its use has recently stabilised, or even declined. However, these effects are in contrast to pronounced increases in Central and Eastern Europe, and prevalence is also increasing in South America (including the Caribbean and Central America), in Africa, and in several countries across Asia (United Nations Office on Drugs and Crime 2005).

Data on 'lifetime use' of cannabis gives an indication of the upper limits of the population of young people at risk. Within studies of youth drug use, this is the most commonly used indicator. However, measures of recent or regular use are more useful for thinking about the population most exposed to hazard and measures such as 'any use in the past 30 days' and 'daily use' are typically reported at lower rates. The following overview summarises international data

for a variety of school and community samples of young people internationally (predominantly those aged 12-18)\*.

### North America

Within the USA in 2003, 46.1% of 17/18 year olds reported 'lifetime' (i.e. use on one or more occasions 'ever') use; though the more sensitive measures of cannabis use in the 'past 30 days' and 'daily use' are lower, at 21.2% and 6% respectively: a pattern that is found in all studies of youth drug use, where such questions are asked (Johnston *et al.* 2004). In Canada, studies such as the Ontario Students Drug Survey and the Nova Scotia Students Drug Use Survey reveal very similar patterns of cannabis use to those in the USA.

### Central America and Caribbean

Central American countries tend to report lower levels of lifetime use. For Mexico, in 1998, 2.4% of males and 0.45% of females aged 12-17 year olds had used cannabis within the past 12 months (Medina-Mora *et al.* 2003a, 2003b) and 3% of Guatemalan 12-18 year olds reported lifetime use. In the early 1990s, lifetime cannabis use was reported by about 17% of young people in Jamaica and Barbados, but only 1.8% of young people in the Dominican Republic.

### South America

In South America, cannabis use is generally tending to increase across the continent, but rates are substantially lower than within Europe or North America, with considerable variation between countries. Thus, lifetime cannabis use is reported to be low, at 1.8% among 17-19 year-olds in Peru and also within a Venezuelan school survey. The rate is higher in Bolivia – 3.5% of 12 to 21 year olds; Uruguay – 3.7% of 12-19 year olds; Ecuador students – 3.9%; Brazil – 7.6% of 10-18 year-olds; Colombia – 9.2% of 12-24 year-olds and Chile – 11.1% of 12 to 18 year-olds.

### Africa

Data quality in Africa frequently limits what can confidently be said about drug use among young people in many countries. In general, reported rates appear to be lower than most industrialised countries, yet again, with some signs that they are tending to increase. A recent sample of 2732 Cape Town 15-16 year-olds derived from a school survey, Parry *et al.* (2004) have reported lifetime use of: cannabis 32% (males) and 13.1% females. There is suggestive evidence, but no survey data, that rates are lower in many other African states.

### Asia

China's cannabis consumption appears to be low. In Nepal, 1992 data suggested that lifetime use cannabis was 6.1%, whereas in part of southern India cannabis had been used by 27% of students. There are also signs that the impact of tourism is shifting young people's cannabis use in India from bounded, religious contexts towards the recreational patterns characteristic of more industrialised countries (Charles *et al.* 2005). Unusually, heroin use sometimes exceeds the use of cannabis, as in Tashkent, Uzbekistan where among 25.9% of drug users 78.5% had used heroin but only 14% reported cannabis use.

\* Other than where references indicate the use of more recent data, prevalence rates in this section are from the report: *World situation with regard to drug abuse, with particular reference to children and youth* (United Nations 2001).

Country/Year	Source	Age group	Nearly daily/Daily
Australia 2004	Australian Institute of Health and Welfare (2005)	14-19	1.6%
USA 2003	Johnston <i>et al.</i> (2004)	17-18	6.0%
Spain 2002	EMCDDA (2004b:89)	14-18	3.6%
France 2002	EMCDDA (2004b:89)	17-19	9.2% (boys) 3.3% (girls)

### Europe

In West Europe, there is considerable variation in rates of cannabis use: among 15-16 year-olds, lifetime prevalence ranges from countries with comparatively low rates in Portugal (8%), Sweden (8%), Greece (9%), and Finland (10%) to others with relatively high rates: Spain (30%), Ireland (32%), France (35%) and the UK (35%). Romania is another notable exception, as only 1% of young people report having tried cannabis but 8% have tried heroin.

### Australia and New Zealand

Rates of illicit drug use among young people in Australia and New Zealand are broadly similar to those in North America, with the lifetime prevalence of illicit drugs being highest for cannabis and lowest for heroin.

Considering the wide extent of its use, very few harms are reported among the millions of experimental and occasional cannabis users. However, evidence that risks increase with more frequent, heavy use is accumulating; with indications that frequent heavy use is associated with cannabis dependence (Coffey *et al.* 2002), depression and anxiety (Patton *et al.* 2002) and later development of psychosis (Fergusson *et al.* 2005). Among the many people reporting lifetime use, smaller numbers of regular/daily users are consistently found and it is this population that is exposed to the greatest risk of harm.

## VARIATIONS IN CANNABIS TYPE AND POTENCY

Two *types* of cannabis are generally available: a herbal preparation (commonly known as marijuana, grass, weed etc.) and a resin (hashish). Concentrated oil is also available, but rarely encountered and not considered further for this reason.

*Type* has some bearing on the way that cannabis is consumed and factors that relate to risk including: the mix of psychoactive ingredients, the speed and efficiency with which these get to the brain, the nature and extent of contaminants and the impact of all its constituents on the gut or lungs.

Cannabis is most commonly smoked; either on its own or with tobacco in hand-rolled cigarettes or, in a variety of pipes, bongs and similar devices. It may also be used in a vaporiser. This is generally regarded as safer because the active ingredients are released at a lower temperature than with smoking, which avoids the inhalation of smoke particles, with the additional risks these pose.

Just as adulterants, contaminants and diluents may have a bearing on health with other drugs, there are anecdotal suggestions that low-grade resin - known as 'soap bar' in places such as the UK - may have contents that are hazardous to health such as toluene and benzene. However, there has been little research on the extent to which this occurs and any accompanying risks.

Finally, cannabis is sometimes eaten: a less popular method that avoids smoke-related hazards but has a slow onset that makes dose regulation harder. Cannabis is not injected.

Cannabis's main psychoactive compound is delta 9 tetrahydrocannabinol (THC) - for which there are several isomers and closely related compounds. Other cannabinoids, notably cannabidiol (CBD), can moderate the effects of THC and there is suggestive evidence that CBD may even exert an antipsychotic effect (Long *et al.* 2005). The THC/CBD ratio is therefore a potentially important area of study within questions of the impact of cannabis on mental health. However, to date, studies of cannabis potency have mainly focused on THC content and it is premature to draw conclusions as to whether some forms of cannabis are more or less harmful than others as a result of their differential THC:CBD ratio.

The potency of cannabis has recently been reviewed by the European Monitoring Centre on Drugs and Drug Addiction (EMCDDA 2004a). Key conclusions were that:

- There are a number of important methodological limitations to the quality of existing data.
- Whereas cannabis resin is commonly consumed in many European countries it is rarely seen in the USA - where herbal cannabis dominates the market. This limits their comparability.
- Natural variation in THC content between and within samples at any one time and place exceeds any long term changes that have happened in Europe or the USA.
- Intensive indoor cultivation of herbal cannabis usually results in a more potent (up to 2-3 times) product than imported herbal cannabis. However, the potency ranges of intensively grown and imported cannabis overlap.
- The overall increases in potency observed in some countries (e.g. the Netherlands) are largely attributable to increased use of home-grown cannabis.
- There is no marked upward trend in the potency of herbal cannabis or cannabis resin imported into Europe.

Its final conclusion states that:

*“there have been modest changes in THC levels that are largely confined to the relatively recent appearance on the market of intensively cultivated domestically produced cannabis. Cannabis of this type is typically more potent, although it is also clear that the THC content of cannabis products in general is extremely variable and that there are some samples that have always had a high potency...An important point to note is that the possibility of additional public health problems caused by the use of high potency cannabis as compared to cannabis products in general remains poorly understood.”*

Perhaps the most important point is that the systems for monitoring changing potency are poorly developed and, at present, largely opportunistic, as they rely on cannabis seizures rather than more systematic sampling from cannabis markets. Considerable work is yet needed to ensure that the methodologies used for assessing THC potency - along with other potentially significant compounds - generate properly comparable data between places and across time.

#### **Cannabis production**

The 2005 World Drug Report reports that 114 cannabis producer countries have been identified, with significant exporter states existing on every continent other than Antarctica. North America is thought to produce more cannabis than any other region and global production is currently rising. Furthermore, increases in THC potency have been reported within the USA, Netherlands and Canada (United Nations Office on Drugs and Crime 2005).

Beyond reliance on traditional cannabis exporters, there are indications that domestic cultivation is increasingly meeting demand. For example, marijuana was the 8th most important agricultural commodity grown in Washington State, USA in 2005 (CBS 2006). The development of stronger strains of cannabis grown hydroponically by widely-dispersed, small-scale producers may also be altering some cannabis markets (for example, Hough *et al.* 2003).

## **CANNABIS AND PSYCHOSIS**

This section describes what is currently known about the relationship between cannabis and psychosis - the most serious, and often enduring, form of mental illness: symptoms of which may include conditions which affect the mind and where there is some loss of contact with reality. Some of the characteristic symptoms of psychosis are confused thinking, disorientation, delusion, false beliefs, hallucinations and changed feelings and behaviour. *Schizophrenia* is a psychotic illness in which the changes in behaviour and other symptoms occur in individuals for periods

of six months or more, with at least one month in this disturbed period marked by two or more psychotic symptoms. People with schizophrenia find it difficult to function in daily life.

*A schizophreniform disorder* is similar to schizophrenia but the symptoms last for less than six months and it is not marked by a decline in functioning.

*Depressive episodes* may be mild, moderate and severe and diagnosis of an episode requires symptoms to have lasted for at least 2 weeks. Symptoms of depression include lack of energy, impairment of sleep, problems with concentration or appetite and suicidal thoughts. These symptoms are frequently combined with symptoms of anxiety such as insomnia, tension and irritability.

Understanding the links between cannabis and psychosis has been a challenge for scientific study, its methods and interpretation, which has left an ongoing debate about the significance of the research findings for public health (MacLeod *et al.* 2004).

### **Risk factors for mental illness**

The reasons why some people develop psychosis and schizophrenia are not fully understood. Schizophrenia is now considered to develop as a result of an interaction between biological predisposition to the disease and the individual's environment. Research has shown that there is a strong genetic contribution to schizophrenia and those with close relatives with a history of schizophrenia and other psychiatric illnesses have an increased risk of developing the disease over that of the general population. However, 85% of those with schizophrenia have no close relative with the disease and a range of environmental factors have been posited as contributing to the susceptibility to schizophrenia, with a gene-environment interaction coming into play. For example, living in an urban environment can increase the risk of developing schizophrenia by one-third (Krabendam & Van Os 2005). Family risk factors include maternal infections and flu during pregnancy or use of painkillers by the pregnant mother, although the majority of the factors have been found to have a modest effect. Other possible risk factors identified by research include disturbances in early development, urbanization and migration (Maki *et al.* 2005).

### **The relationship between cannabis and psychological harm**

There are four main views on the nature of the association between cannabis and later mental disorders. Firstly that the link may be due to sociodemographic, economic or genetic factors common to both cannabis use and the disorder. Secondly, the self-medication hypothesis suggests that patients with mental health problems may be using cannabis and other drugs as a form of self-treatment for their condition. Thirdly that cannabis directly causes new cases of the mental disorder. Finally, the vulnerability hypothesis proposes that the use of cannabis can increase the risk of mental health problems for some at-risk people (Hall *et al.* 2001).



## Acute, short-lived psychotic episodes

There is abundant research evidence that cannabis can cause short-lived psychotic episodes. Medical case reports have identified a number of symptoms including mild impairment of consciousness, distortion of time sense, a dream-like euphoric state, fragmentation of thought processes, and auditory and visual hallucinations.

Episodes are brief and the person soon recovers. The precipitating role of cannabis in these episodes is confirmed by its use immediately preceding the onset of these attacks and the episodes remitting on cessation of cannabis use (Hall & Degenhardt 2000).

## Prevalence of cannabis use among people with schizophrenia

There is evidence from a range of national and local studies that rates of cannabis use are higher (approximately two-fold) among people with schizophrenia than in the general population. For example, the US National Epidemiological Catchment Area study (Robins & Regier 1991) indicated that 50% of those identified with schizophrenia also had a diagnosis of substance use disorder (abuse or dependence), compared with 17% of the general population (Regier *et al.* 1990). People who used cannabis on a daily basis were 2.4 times more likely to report psychotic experiences than non-daily cannabis users, after controlling for a variety of confounding variables including sociodemographic factors, social role, and other psychiatric conditions (Tien & Anthony 1990). Similar findings have emerged from surveys in Australia and the Netherlands (Hall & Degenhardt 2000; Van Os *et al.* 2002). Rates of cannabis use have also tended to be twice as high among patients with psychosis in local hospital studies than in community controls, regardless of the treatment setting (Grech *et al.* 1998).

## Cannabis and the development of schizophrenia and psychosis

While studies have found elevated rates of cannabis use amongst those with schizophrenia and psychosis, a number of carefully designed prospective studies have helped to assess the nature of the relationship involved and whether cannabis use precedes schizophrenia. The studies have used a variety of different populations to chart the role of a range of risk factors, of which cannabis is just one. The findings from these studies have been summarised in a number of reviews (Arseneault *et al.* 2004; Smit *et al.* 2004), one systematic review paper (Semple *et al.* 2005) and one meta-analysis (Henquet *et al.* 2005).

## What is the relationship between cannabis and psychosis?

While these various studies used a range of methodologies, measurements of cannabis use and psychosis and, in some cases like the Dunedin birth cohort study and the Dutch NEMESIS study of mental health in the general population, were marked by small sample sizes, there was some consistency in the risk of developing psychosis after cannabis use across all the populations studied. Regular cannabis use increased the chances of developing later schizophrenia

or schizophrenia-like psychotic illness by approximately two to threefold (Arseneault *et al.* 2004; Semple *et al.* 2005). In the Dunedin study those who started their cannabis use by age 15 years had a higher risk of developing schizophreniform disorder by age 26 than those who started at age 18, suggesting that early cannabis use may provide higher risk of psychosis outcomes (Arseneault *et al.* 2002). The analysis from a birth cohort study in Christchurch New Zealand has gone the furthest in terms of controlling for a wide range of possible confounding demographic, social and individual factors in their analysis and suggested that the association between cannabis use and psychosis in the study population is unlikely to be due to confounding factors (Fergusson *et al.* 2005). The analysis also suggested that the direction of causality was from cannabis to psychosis, undermining the self-medication hypothesis.

However, the increased rates of cannabis use in the last thirty years have not been accompanied by a corresponding increase in the rates of psychosis in the population (Degenhardt *et al.* 2003a). The studies reviewed here suggest that cannabis is a modest statistical risk factor and the vast majority of young cannabis smokers do not develop psychosis, supporting the hypothesis that a small minority of users may be vulnerable to the effects of cannabis. The vulnerability hypothesis has received some support from a study that explored substance use and psychotic experiences in daily life. The acute effects of cannabis were stronger among participants with high vulnerability for psychosis (experiencing at least one bizarre psychotic symptom or at least two non-bizarre symptoms over the first month). Those vulnerable participants reported increased level of perceived hostility and unusual perceptions, and also decreased level of pleasure associated with the experience of using cannabis (Verdoux *et al.* 2003). Studies of the family histories of users and non users add further support to this model. The Edinburgh High Risk study found that frequent cannabis use, among young people with a family history of psychosis was associated with a six-fold increase in the risk of psychosis compared with controls (Miller *et al.* 2001) Adding further weight to the strength of the vulnerability hypothesis is a recent study, awaiting replication, that examined a gene-environment interaction in the Dunedin study population, finding that a gene called COMT moderated the influence of adolescent cannabis use on developing adult psychosis in the Dunedin sample (Caspi *et al.* 2005).

## Cannabis and the course of schizophrenia

The results from a number of studies suggest that cannabis use can make the symptoms and treatment outcomes of those with the illness worse. In one prospective study cannabis-using patients were compared to patients who did not use cannabis in an outpatient setting in Holland. The patients' psychiatric health was tracked each month for a year. The cannabis users had more and earlier psychotic relapses or exacerbation of symptoms, which was significantly more noticeable among the heavy users. These effects persisted after controlling for other drug and alcohol, use, antipsychotic medication adherence and dosage (Linszen *et al.* 1994).

More recent prospective studies have had longer follow-up studies. For example, one long-term case-control study followed 115 first episode patients with six assessments over a five year period. However, this study only had 4 cannabis users in the sample who were combined with the conjoint alcohol and alcohol users only in the group for analysis. The substance misusers fared worse than the non-users, with poorer treatment adherence, lower use of rehabilitation services and showed higher positive symptoms at each assessment.

However, not all studies have found that cannabis use has a negative effect on the course and outcome of schizophrenia. Two community studies, one in America and one in Scotland, found that past or present substance misuse (mainly cannabis) had little adverse impact on symptoms, course of illness or service use (Zisook *et al.* 1992; Cantwell 2003). The mixed results from these studies may reflect the difference in the samples studied and the research designs used. Some studies did not control for the effect of medication, possibly confounding the results. The strongest evidence available currently suggests that cannabis does worsen the prognosis for the majority of those with schizophrenia who also smoke cannabis; but, that there may be a subgroup who finds its use beneficial in coping with side effects of their medication or dealing with the negative symptoms of their illness.

### Cannabis, anxiety and depression

Cannabis and its relationship with anxiety and depression has received less research attention in comparison to schizophrenia and psychosis. National population studies have found evidence for a link between cannabis use and depression. A study of a nationally representative sample of 7000 adults aged 15 to 45 in the USA, found a small increased risk of depression among the current users of cannabis (Chen *et al.* 2002). Another study of a nationally representative sample of 40-50 year olds in the USA found an small increased risk, but one that was associated with earlier onset of cannabis use rather than current use (Green & Ritter 2000). A national population study in Australia found that cannabis users were between two to three times more likely to meet criteria for a mood disorder than non-users. Prevalence of mood disorders increased from 6% in non-users to 14% of those who met criteria for cannabis dependence (Degenhardt *et al.* 2001).

In a longitudinal study of a representative sample of 1601 secondary school students in the Australian state of Victoria, weekly or more frequent use led to a doubling of the risk for later anxiety or depression by the age of 20 years, while female daily users had a fivefold increase in later depression and anxiety. (Patton *et al.* 2002). Depression and anxiety in the students did not predict later cannabis use in the analysis, suggesting that cannabis was not used for self-medication. However, findings from the smaller New Zealand Dunedin sample reported above indicated that those in the sample using cannabis by age 15 did not have a significantly higher risk of later depression by the age of 26 years than non-users did, although the sample size may prevented the identification of a relationship in the statistical analysis (Arseneault *et al.* 2002). The Dunedin study, how-

ever, did find that using cannabis three or more times by age 18 was a moderate predictor of depression by age 26 after controlling for a range of variables in the statistical analysis. A meta-analysis of cohort studies found a modest but significant association between early onset heavy use of cannabis use and later depression (Degenhardt *et al.* 2003b). In a follow-up study of the New Zealand Christchurch sample, the analysis controlled for a range of confounding factors that might explain the association between cannabis and a range of psychosocial outcomes including depression and suicide attempts. The link between cannabis and these outcomes and heavy (at least weekly) cannabis use still persisted, suggesting that cannabis was contributing directly to these outcomes (Fergusson *et al.* 2002).

Like depression and schizophrenia, anxiety disorders are found at higher rates among frequent users of cannabis than non-users. There have been a number of case reports of panic reactions after cannabis use. In a survey of 1000 young adults in New Zealand, acute anxiety and panic was the most common psychiatric problem reported by cannabis smokers in the study (Thomas 1996). As indicated above, the Victorian longitudinal study found an increased risk of mixed anxiety and depression after daily cannabis use (Patton *et al.* 2002). However, the few other longitudinal studies in this area have generally tended to fail to find a relationship between anxiety and cannabis use or found that other factors account for the relationship. For example the Christchurch study found that although substance (mainly cannabis) abuse and dependence was higher among those with an anxiety disorder, the association could largely be the results of a range of factors such as childhood and family factors, peer affiliations and co-morbid depression (Goodwin *et al.* 2004).

### Conclusion

Taken as a whole, the available epidemiological evidence suggests that cannabis can exacerbate the symptoms of schizophrenia. The best available evidence from the existing range of prospective epidemiological studies indicates that cannabis can precipitate schizophrenia in people who are already vulnerable for individual or family reasons. Those with a psychosis vulnerability may also be at an increased risk of experiencing psychotic symptoms, particularly if their cannabis use is regular. The evidence for an association between cannabis use and depression or anxiety is mixed, with longitudinal research suggesting that cannabis is a moderate risk factor for later depression but that the relationship between cannabis and anxiety is likely to be the result of other mediating factors such as childhood and family factors.

Although more research work is needed to understand the pathways involved, this implies that a precautionary approach should be adopted, which aims to minimise any contribution cannabis makes to the development or exacerbation of psychotic illness. For prevention, this implies:

- The adoption of strategies to reduce cannabis use, with a specific objective of minimising regular and heavy patterns of consumption.



- Targeting responses at adolescents and young adults, as cannabis use during brain development may engender heightened risk, and this is also the time when schizophrenia most commonly develops.

For people with schizophrenia, the UK's Advisory Council on the Misuse of Drugs (2005) has also recommended:

- Enhanced measures to protect people from in-patient exposure to cannabis and help them avoid drug use in the community.

Currently, the main domains in which interventions are contemplated include: legal controls, education, health services and structural approaches. While some of these point towards relatively immediate and direct responses, others imply longer term social changes.

## HOW MIGHT RISKS AND HARMS BEST BE MINIMISED?

### Legal controls

Six major options have been identified for controlling cannabis through the legal system (McDonald *et al.* 1994). Most of the published research has been done on moving from *strict prohibition* to *prohibition with civil penalties* with a few studies on the impact of the Netherlands' *Prohibition with an expediency principle scheme*. Under *prohibition with civil penalties*, possession and use remain illegal but civil rather than criminal penalties apply and more severe sanctions are maintained for larger scale possession supply offences. Such a system applies to cannabis use in 11 U.S. states and four Australian jurisdictions. Under *prohibition with an expediency principle*, all-drug related activities are illegal, however, cases involving defined small quantities are not investigated or prosecuted by police. Examples of this system operate for cannabis in Belgium, Germany, Denmark and the Netherlands (EMCDDA 2003).

Most countries, being signatories to the three main international drug conventions are bound to have systems in place that prohibit the availability of certain drugs. While interpretations of these laws differ, most commentators (e.g. Krajewski 1999) agree that *prohibition with civil penalty systems* and *prohibition with an expediency principle schemes* comply with the treaties because the drug offences remain illegal on the statute.

Although the published evidence evaluating the impact of cannabis policies is not large, caution needs to be exercised in its interpretation. The policy environment is a dynamic one where effects decay and what is implemented changes over time (Pacula, Chriqui, & King 2003). International comparisons are difficult and results can be confounded by cultural, political, geographic and climatic differences. Cannabis law reforms often occur in locations with already high rates of use, consequently pre-post or longitudinal designs with 'matched' control locations are needed to identify true impacts. Any research evidence is at best indicative – as the

actual impacts of any future cannabis policy reforms will depend on contextual factors and how the reforms are implemented. Therefore it is important that changes to cannabis policy are evaluated, monitored and reviewed.

### Policy impact studies

In the US, four controlled studies conducted on those 11 States which introduced *prohibition with civil penalty schemes* between 1973 and 1978 found they did not experience greater increases in cannabis use among adults or adolescents, nor more favourable attitudes towards the drug, than those states which maintained strict prohibition with criminal penalties (Single, Christie, & Ali 2000; Theis & Register, 1993). A study of hospital emergency room data suggested that decriminalisation of cannabis in these States was accompanied by a significant decrease in emergency room episodes involving drugs other than cannabis, and an increase in cannabis episodes suggesting that when civil penalties were introduced illicit drug users tended to stay with the use of the less penalised cannabis, and move away from the use of the other more severely punished illicit drugs (Model 1993).

Research on the impact of the South Australian Cannabis Expiation Notice (CEN) system, which having commenced in 1987 is the longest running and most researched Australian scheme, concluded that rates of recent (weekly) use by adults, and rates of use among young adults and school students had not increased at a greater rate in South Australia than other States which maintained criminal penalties (Donnelly, Hall, & Christie 2000). However, the social costs of a criminal conviction were greater than those of a civil penalty system in terms of adverse impacts on employment, further trouble with the law, relationships, accommodation etc., yet criminal penalties were no better than civil penalties at deterring the use of those apprehended (Lenton, Christie *et al.* 1999, 2000).

### Cross-national comparisons

A cross national comparison between the Netherlands, other European states and the USA, shows that despite the introduction of cannabis *coffeeshops* the Dutch do not have higher rates of cannabis use than these other countries (MacCoun & Reuter 1997). However, while reductions in criminal penalties in the Netherlands from 1976 to 1992 have had only limited effects on cannabis use, the increase in commercial access to cannabis in the Netherlands from 1992 to 1996 with the growth in numbers of cannabis *coffeeshops* has been associated with growth in the cannabis using population, including among young people (MacCoun & Reuter 1997, 2001a). In follow-up published correspondence these authors suggest that the use of *prohibition with civil penalties*, rather than *partial prohibition* with increasing commercialisation of the cannabis industry through a *coffeeshop* system, might meet the same goals with fewer risks (MacCoun & Reuter 2001b).

A recent comparison of representative samples of experienced cannabis users (used 25 times or more) in similar cities with opposing can-

nabis policies—Amsterdam, (decriminalisation), and San Francisco, California (criminalisation) found no evidence that ‘criminalisation’ reduced use or ‘decriminalisation’ increased use. Rather, except for the higher rates of cannabis use in San Francisco, they found strong similarities across both cities (Reinarman, Cohen & Kaal 2004).

### ***Economic analyses***

There have been at least four economic analyses of the impact of introducing *prohibition with civil penalty schemes* on law enforcement and other costs. These suggest potential for substantial criminal justice savings, the magnitude of which depends on the size of the jurisdiction and the cost of the existing mechanisms for control of minor cannabis offences. Thus in California, annual savings were estimated at \$US100 million (Aldrich & Mikuriya 1988), in Massachusetts at \$US24.3million (Miron 2002) and in South Australia at less than \$US1 million p.a. (Brooks *et al.* 1999). Prior to the reclassification of cannabis in the UK, the annual cost of policing cannabis was also estimated at £50 million (May *et al.* 2002:38).

### ***The criminological evidence***

Most criminological research on the deterrence impact of cannabis law has shown that the certainty of apprehension, rather than the severity of punishment, is more likely to produce deterrence. However, criminal penalties are not a major deterrent to cannabis use, not least because the likelihood of being apprehended for a minor cannabis offence is extremely low. The evidence strongly suggests that applying criminal penalties to minor cannabis offenders fails to deter use in the general community or among those apprehended, but imposes significant social costs on those unfortunate enough to get apprehended, many of whom are an otherwise law-abiding group.

A range of other factors such as public attitudes to cannabis use, the perceived fairness of the law and its enforcement, peer influences, and the utility of cannabis use are likely to far outweigh the deterrent value of a criminal conviction (Lenton 2005).

## **Education, public health and treatment responses**

As has been noted, the risks of psychosis appear to increase with the frequency and heaviness of use, and it seems likely that, compared to adults, young people are most susceptible to these and other adverse effects (Solowji & Greyner 2002). This strongly suggests that an emphasis upon young people’s use would be channelled where need is greatest and interventions can be most effective. Agencies working with young people have diverse opportunities to provide a range of *education, treatment and public health* interventions that are relevant to cannabis users.

### ***Education***

It has become commonplace for policy makers to look to education within responses to a diverse range of intractable health and social problems: an underpinning assumption being that better informed

young people will not engage in behaviours that can be pleasurable but carry risks. As such, drug education has mostly been approached as a form of *primary prevention* that may help stop people using drugs such as cannabis and substantial efforts to promote abstinence have taken place within school-based education. However, despite their widespread use, the evidence suggests that, to date, they have very poor effectiveness. An extensive review for the World Health Organisation (Hawks *et al.* 2002: x-xi) concludes that:

*While the majority of studies reviewed, deriving mainly from the United States, have abstinence as their goal, there is evidence that programmes having this goal consistently fail to produce behavioural effects suggesting that there is a need to develop programmes with outcomes other than abstinence as their goal.*

This suggests that although it may be feasible for drug education to produce a better informed population - of both cannabis users and abstainers alike - it is unrealistic to look to drug education to have any primary preventive effect. This does not rule out other efforts to reduce harm (e.g. targeted work to delay commencement or, that aims to reduce cannabis smoking during school time when it has the most detrimental effect on learning) but points to limitations to what might reasonably be expected in this domain.

It is noteworthy that efforts to promote abstinence have largely eclipsed any concerted efforts to delay use or avert regular, riskier and heavy use among the many young people who use cannabis. Our present understanding highlights these as areas where education efforts might yet be worthwhile, and suggests that a concerted programme of development and evaluation may still yield valuable gains with these less ambitious, but possibly more realistic objectives.

Regardless of the impact of educational approaches concerning cannabis, retention and engagement within education is one critical protective element of the structural environment that shapes young people’s development – discussed in more detail later. Conversely, truancy and exclusion from school can rapidly consolidate social networks and values that favour regular cannabis use; exacerbating problems in the most marginalised and vulnerable youth. This highlights the importance of programmes that aim energetically to include and retain these groups within education.

### **Public health approaches**

Within a *public health* approach to cannabis use, numerous parallels exist with the way in which tobacco smokers and alcohol drinkers are addressed with targeted messages such as those concerning the health effects of smoking and within ‘drink driving’ campaigns. To date, few concerted, evaluated efforts have been made in this area for cannabis. There are nevertheless a range of population-based messages for cannabis users that have the potential to reduce harm and enhance health using a combination of mass media and targeted approaches drawing on ‘social marketing’ techniques

(Henderson & Bennett 1999). This is therefore an area that is worthy of development. The following list is indicative of some areas that could potentially be addressed:

**Mental health** – Promoting awareness of a) the general risks of adverse acute reactions to cannabis and possible triggering of psychotic illness; b) heightened risks for people with family history of disorder/personal history of adverse effects; c) the desirability of abstinence, particularly for people with heightened risk.

**Dependence** – Public campaigns that a) reinforce awareness of the risk of cannabis dependence; b) promote self-control strategies; c) publicise awareness of treatment and pathways for help-seeking.

**Legal harms** – Publicising the risk of harm that can arise through criminal/civil consequences of conviction such as a) impacts on freedom to travel, b) exclusion from employment/education and other forms of disenfranchisement e.g. the loss of entitlement to vote in the USA.

## Treatment

Although the great majority of cannabis use does not appear to become problematic, use of cannabis already makes an important contribution to the overall demand for drug treatment. As the United Nations Office on Drugs and Crime (2005:94) concludes:

*Despite its widespread use, cannabis does not generate demand for treatment at the rate of other street drugs, but more than 60% of treatment admissions in Africa are cannabis-related, compared to 45% in North America and 30% in the Oceania region.*

Within Europe, demand for cannabis treatment is also climbing, with indications that cannabis is the ‘primary drug’ in 12% of treatment episodes - second only to heroin (EMCDDA 2005a:40). Though it should be noted that such statistics are, to some extent, artefacts of the various monitoring systems that are being used.

It is not yet clear how the effectiveness of treatment can be optimised but there is growing evidence that it may fulfil a useful role (Loxley *et al.* 2004). The recent UK Advisory Council on the Misuse of Drugs report explicitly identifies treatment for cannabis dependence as an area requiring development, along with a parallel programme to enhance the evidence-base for practice (Advisory Council on the Misuse of Drugs 2005).

*Treatment* options include treatment for dependence and ‘brief interventions’ drawing on principles such as motivational interviewing. To date, cannabis/youth drug use treatment approaches have largely derived from existing work in the alcohol field and with other illicit drugs; using approaches largely grounded in cognitive behaviour work, along with self-help manual based approaches with both abstinence and non-abstinence/harm reduction goals. Some recent evidence points to the utility of a single motivational interviewing

session for reducing consumption, though again complete cessation of cannabis use was less common: a notable study because its effect seemed most pronounced on more vulnerable and ‘high risk’ youth (McCambridge & Strang 2004). Such work requires replication and further development.

Similar problems similarly limit what can be said about the effectiveness of drug treatment for young people in general. Nevertheless, one systematic review points to developing evidence – largely North American – that assorted counselling and family-focused approaches can sometimes a) reduce drug use b) improve well-being, and c) improve family and social relations (Elliot *et al.* 2002). Again, further development and evaluation is required to understand to what extent such results are reproducible in other contexts and are applicable specifically to cannabis.

With specific regard to cannabis and mental health problems, it seems likely that enhancing systems/liaison between youth services, drug treatment agencies and adolescent/adult psychiatric services could be beneficial. It is, as yet, unclear to what extent wider, general health services might contribute to the reduction of cannabis-related harm, but it seems noteworthy that the ACMD have recently highlighted the importance of addressing cannabis use and prevention for patients with schizophrenia (2005).

Finally, scanning the horizon within treatment/health responses, the very early evidence (Caspi *et al.* 2005) that part of the population may be more susceptible to problems with cannabis due in some part to genetic factors suggests that, in time, genetic screening may have some role to play as a tool for providing people with individualised health information about heightened risks/vulnerability. However, the contribution of any such genetic factors requires further clarification before any such measure could become feasible.

## Structural interventions

There is increasing recognition of the ways that problem drug use are determined by structural factors at the global, national and community-level including: socioeconomic deprivation, income inequalities, social inclusion, social cohesion and the cultural capital available within communities (Spooner *et al.* 2001). This strongly suggests that interventions focusing on the individual are profoundly constrained if structural determinants of problem cannabis use, as a component of problem drug use in general, are ignored. Such approaches typically focus on enhancing *protective factors* and reducing the *risk factors* to which young people in general, along with those from specific vulnerable groups (e.g. young offenders, children within care systems, street children, school excludees and some ethnic minority groups) often have multiple exposure (The Health Advisory Service 2001; Benson *et al.* 2004).

The literature cited above reveals that many such factors are identifiable. Some are susceptible to more immediate, programmatic approaches. For example:

## CANNABIS AND THE UN INTERNATIONAL DRUG CONTROL SYSTEM.

The United Nations Conventions on drugs classify narcotic drugs and psychotropic substances by virtue of their danger to health, risk of abuse and therapeutic value. The 1961 Single Convention on Narcotic drugs is the bedrock of the current international system. While there is a certain degree of flexibility within the extant treaties (1961, 1971, 1988), the prohibitive ethos of the system is clear. Article 4(c) of the Single Convention obliges signatory nations, subject to the provisions of the Convention, to limit exclusively to medical and scientific purposes the production, manufacture, export, import, distribution of, trade in, use and possession of drugs listed. The Single Convention classifies narcotic drugs in four schedules. Cannabis is listed twice. It is in Schedule I, as a substance whose properties give rise to dependence and which presents a serious risk of abuse. It is also in Schedule IV, among the most dangerous substances, by virtue of the associated risks of abuse, its particularly harmful characteristics and its extremely limited medical or therapeutic value (EMCDDA, 2005b).

Cannabis first came under a limited form of international control at the Geneva Conference in 1925, on the insistence of the Egyptian delegation. This was accepted despite the fact that the issue was not on the agenda and according to the British delegate was yet “in an unprepared state.” During the 1930s the implementation of international controls was pushed for by the US, which was troubled by the use of the drug within its own borders. Between 1935 and 1939, a cannabis subcommittee, appointed by the Special Advisory Committee on Traffic in Opium and Other Dangerous Drugs of the League of Nations, amassed a large collection of data on cannabis. Although the situation in India was overlooked in the research effort, the documents produced by the subcommittee showed an awareness of the cultural differences in the use of cannabis and the difficulties surrounding control of the drug. There was, however, little follow-up to this research with later decisions within the international system relying on information and reports of a less relevant nature. The first session of the Commission on Narcotic Drugs (CND) of the UN in 1946 did not appoint a subcommittee on cannabis, but the legal status of the drug soon became a concern for those drafting the Single Convention; a process which started in 1948. After some debate concerning its medical usefulness and harmfulness, and the selective use of the evidence base by those in favour of outlawing the drug, the definitive decision to adopt a prohibitionist position on cannabis in the Single Convention was taken by the CND in 1955. Again the US was the primary force behind this decision and as such mobilized the appropriate international organs within the UN drug control system. By the time of the plenipotentiary conference for the Single Convention it was a foregone conclusion that cannabis would be placed under the strictest control regime (Bruun *et al.* 1975). Beyond negotiations for reservations concerning transitional periods for phasing out the traditional use of the drug in countries like India, there was no discussion of the classification of cannabis alongside heroin and cocaine within the Convention. Despite the limited contemporary scientific justification for this state of affairs, there remains a reluctance to revisit the place of cannabis within the international drug control system.

- Reducing high substance availability within particular neighbourhoods;
- Programmes to reduce school exclusion; and,
- Tailored work targeting vulnerable groups such as young offenders or street children/youth homeless.

Others are deeply embedded within social and economic conditions, often intersecting and unlikely to be amenable to change within the short to medium term such as:

- Endemic, trans-generational socio-economic deprivation;
- Racism and the social exclusion of ethnic minorities such as Roma within Europe and indigenous peoples in Australia, New Zealand, the USA and Canada; and,
- Heightened availability arising from emerging and established patterns of drug production and their associated trafficking transit routes.

contrast, cannabis is readily cultivated in almost any country; as the knowledge, seeds and technology to grow it are readily available. Supply reduction strategies therefore have even poorer prospects of success than for other illicit drugs; pointing towards the need for a strong emphasis in other areas of our response.

Cannabis use is among the *least visibly problematic* forms of illicit drug use. Present evidence suggests that concerning the most serious drug-related harm - death - the role of cannabis is negligible compared to other legal, prescribed and illicit drugs (Blakemore 2003). Although it is increasingly clear that cannabis use incurs risks, including mental health problems, millions of people use the drug without obvious ill-effects. Regarding its potential to cause serious mental health problems, it is also of note that alcohol has the potential to cause a psychosis – Korsakoff’s Syndrome; so in this sense, the hazards of cannabis use are not unique.

## CONCLUSIONS

The use of cannabis raises a number of distinct challenges for policy makers that, in several respects, set it out from other illicit substances.

Cannabis is *easily cultivated*. Even for drugs that often have to cross national borders, with their corresponding controls – such as cocaine or heroin – the difficulties in reducing supply are well known. By

There are some indications that cannabis potency is increasing, but evidence to date suggests that this effect is relatively modest and uneven and has been overstated in the media. However, our understanding of cannabis markets remains far from adequate and there is an urgent need for better monitoring of cannabis availability within existing supply systems with regard to a) its potency b) its accessibility – especially to young people. Nevertheless, we know that in most countries cannabis is the most *widely used* illicit drug,



being tried by very large numbers of teenagers, regularly used by a significant minority and, in some cases, having been used by a majority of the adult population. In many respects it is now also *culturally-embedded* within youth culture. This widespread and embedded use implies that it will be less amenable to approaches that primarily rely on enforcement through the criminal justice system.

The evidence suggests that as long as cannabis use remains illegal, the more severe criminal penalty schemes are no more likely to deter use than are civil penalty schemes, but criminal regimes result in greater social costs to individuals and more criminal justice costs to communities. Furthermore, criminalizing cannabis users also places many citizens outside of the law and raises the possibility that either a) a large fraction of the population are potentially open to criminal charges, with the corresponding costs to individuals and society b) the law is largely unenforced, or enforced inequitably on certain sectors of society e.g. ethnic minorities – potentially bringing the law into disrepute. At present, the status of cannabis within the existing UN conventions means that it is currently impossible to determine whether bringing cannabis control within a legal, regulated framework could further reduce cannabis-related harms, but this possibility cannot be dismissed and, arguably, deserves cautious study.

Regarding effective policies, unsurprisingly, no simple solutions exist. However, an evidence-based response to cannabis-related harms - including those to mental health - would seem to require a *multi-faceted, developmental approach* that resists populist solutions. This briefing has identified a range of opportunities for further developing interventions within education, treatment and a wider public health approach, each of which has promise but require further evaluation. However, ultimately, cannabis-related harms are only ever likely to be truly minimised in the longer term, if diverse, underlying factors are also addressed. Consequently, any immediate and focused response on interventions should not be allowed to obscure the necessity of addressing the underlying structural determinants of problem cannabis and other drug use.

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