

2.3. The emergence of 'new cannabis' and the reassessment of health risks

The health consequences of cannabis are a matter of longstanding debate. A range of official national commissions have reviewed the topic, and exonerated cannabis of many of the charges laid against it.⁹⁴ But in just the last decade, *sinsemilla* cannabis has doubled in potency in a number of key markets, and a range of recent studies have highlighted the negative impact the drug has on mental health in particular.

The re-engineering of cannabis

Improved breeding and the rediscovery of sinsemilla

Cannabis consumption in the Western world really took off in the second half of the 20th century, and since those early days, consumer tastes have evolved considerably. Most of the cannabis smoked in the 1960s would be considered to be of low quality today. In addition to seeds, it comprised a great deal of the large leaf, twigs, and other material that would be currently regarded as waste. Improvement in the 'manicure' (the portions of the plant offered for sale) may be seen as an inevitable consequence of the maturation of the market.

But law enforcement action in the second half of the 1970s to the early 1980s appears to have inadvertently prompted other improvements in the product. First, it reduced the availability and the quality of imported cannabis in many of the most important consumer markets, particularly the United States. Second, it seems to have pushed some domestic production indoors,⁹⁵ and stimulated growers to focus on producing greater quality rather than quantity in order to evade detection. These developments prompted a revolution in production technology in the United States, which was later spread to Europe and beyond.

Until the mid 1970s, nearly all the cannabis consumed in North America was a landrace⁹⁶ strain of the so-called sativa variety (see Annex 1 for more on the varieties of cannabis). The subjective effects of sativas are preferred by those who are looking for a more cerebral effect, possibly due to high levels of THC relative to CBD levels (see Annex 1). But sativas are both late maturing (making them difficult to grow in northerly latitudes) and very tall (making them difficult to conceal outside and problematic to grow inside). It was not until seed stock from central Asia and the Middle East was introduced to the gene pool that these problems were overcome. These 'indica' genes accelerated the life cycle,

boosted yields, and produced plants that were both more cold resistant and more manageably sized.

Experiments crossing sativa and indica strains led to the development of "skunk", a hybrid said to be 75 per cent sativa and 25 per cent indica, which was among the first to capture the THC high of the sativas with the rapid growth cycle and yield of the indicas.⁹⁷ It remains one of the cornerstone cultivars used in contemporary breeding, and in countries such as Australia, France, New Zealand and the United Kingdom, cannabis with a high THC content is often referred to as 'skunk' today.⁹⁸

At the same time, an ancient cultivation technique was being reinvigorated. The term '*sinsemilla*' refers to the product of a growing technique, not a genetic strain or special preparation of the plant. The most potent cannabis is comprised exclusively of the female flowering heads ('buds') that have remained unfertilised throughout maturity and which, consequently, contain no seeds (i.e. are *sin semilla*, 'without seeds' in Spanish). The production of *sinsemilla* requires identifying the females and ensuring that they are not exposed to male pollen, and then marketing only the buds and small leaves. Cannabis cultivators in India have long known that the best cannabis comes from the unfertilised buds of the female plant, and have employed 'paddars' (ganja doctors) to remove male plants from cultivation areas before they are mature enough to cause any damage.⁹⁹ The technique was also apparently understood in Central America, though it appears to have fallen into disuse. It is very difficult to grow unfertilised plants outdoors in areas of intense cultivation, because a single rogue male can ruin an entire crop. Thus, the law-enforcement prompted move towards more indoor cultivation may have supported the expansion of the production of seedless cannabis.

Most commentators place the emergence of *sinsemilla* in the United States around the early to mid-1970s,¹⁰⁰ and in Europe to about 1980.¹⁰¹ Today, nearly all high-grade cannabis is grown *sinsemilla*. Indeed, while Western cannabis markets may exhibit many shadings, most contain a stark distinction between seedless product grown of good genetic stock (usually produced domestically or in another developed country) and more mundane product, field-grown domestically or in a developing country.

The potency of sinsemilla is much higher than the seeded product, with a 2004 average of about 10.5 per cent THC in the US (as compared to 2.5 per cent for low-grade cannabis)¹⁰² and close to 18 per cent in the Netherlands¹⁰³ (as compared to about 6 per cent for imported cannabis).¹⁰⁴ Individual samples have exhibited THC levels in excess of 30 per cent, although this is extremely rare. Sinsemilla is distinct enough in appearance and potency to be considered a separate drug. There has even been discussion of scheduling sinsemilla as a ‘hard drug’ in countries that have liberalised their cannabis policies.¹⁰⁵

The application of greenhouse technology

In addition to improved breeding and the rediscovery of sinsemilla, the movement towards indoor cultivation has also allowed the application of greenhouse technology to what had traditionally been a field crop.¹⁰⁶ Around 1985, some cannabis breeders from the United States fled for a country with more amenable drug policies – the Netherlands. At the time, indoor cultivation of cannabis was just starting to take off in the Netherlands,¹⁰⁷ and the fusion of American breeding stock and Dutch agricultural practice sparked a revolution in cannabis breeding and production.¹⁰⁸ Today, Dutch ‘seed banks’ sell the product of this breeding over the Internet, in competition with a growing number of rivals, notably those based in Canada.

The first and most obvious boost to sinsemilla production was the use of clones. ‘Cloning’ simply means taking a cutting from a successful ‘mother’ plant, a technique known to anyone who grows houseplants but not generally used in field agriculture. This cutting is rooted and planted. It is a genetic duplicate of its mother and can be used to generate still more cuttings. Eventually, a grower can work with entire crops of genetically identical plants. A square meter of mother plants can produce 100 clones a week.¹⁰⁹

There are several advantages of working with clones. First, the cuttings are guaranteed to be exclusively females. Growing from seed means that half the crop will be waste (male) plants, and overlooking a male can ruin an entire sinsemilla crop. Second, the clones will be duplicates of a mother proven to be a successful producer, and whose lifecycle and weaknesses are known. Finally, the clone assumes the life-stage of the mother, and so needs less time to reach flowering than would a similarly sized plant grown from seed. Used in combination with the forced flowering technique, clones dramatically accelerate the rate of cannabis production.

In addition to selective breeding for fast maturity, the rate at which cannabis plants come to flower can be increased by manipulation of the light cycle. Outdoors, the success of cannabis grown for drug purposes is highly dependent on latitude. This is because most types of cannabis only flower when the days grow shorter. At high latitudes, this happens before the plant has had a chance to fully develop, or is coincident with lethal frosts. This makes outdoor cultivation in much of Europe, for example, very difficult, especially for sativa strains that evolved at lower latitudes. Indoors, these restrictions clearly do not apply, and, in addition, the photoperiod (the amount of light received by the plants during the day) can be manipulated to force flowering whenever it suits the grower.

Forced flowering results in smaller yields per plant than if each plant had been allowed to mature further, but this is more than offset by the faster overall production time and in the greater number of small plants that can be fit into a given growth area. Whereas traditional outdoor growers are limited to one or two harvests a year, indoor growers can stagger production to produce almost continual harvests. The turnaround time from clone to harvest is generally on the order of eight to ten weeks, allowing between four to six harvests off the same square meter of floor space. The best-known example of this is the Dutch “Sea of Green” (SOG) technique, of which there are many variations.

The SOG technique involves cultivating a large amount of plants in a given area for a short period of time before flowering. This results in a smaller yield per plant, but more plants in a harvest, with shorter cultivation periods, which allows for more harvests per year. Different parts of the growing area are used for plants in different stages of their life cycle, staggering production. The total process, from seeds to sales, can take about 16 to 18 weeks, but this can be shortened by the use of clones. From clone to harvest can take as little as two months, allowing up to six harvests a year from the same floor space.

The ‘new cannabis’ has doubled in potency in the last decade.

From the above, it becomes clear that a large number of people in several countries have worked very hard over the course of decades to produce more potent cannabis. But it is still being debated whether their work has had any impact on the potency of the global cannabis supply. As early as 1980, claims were made that cannabis potency had increased by a factor of 10 (from 0.2 to 2

per cent) over five years.¹¹⁰ There have been subsequent claims that cannabis potency has increased by a factor of 30 or even 60 since the 1970s. These claims have been criticised as exaggerated as they rely on the very low THC levels found in some early tests, which may be inaccurate due to storage issues and other methodological difficulties.

Claims of extreme increases in potency and the reaction they have garnered have cast doubt on the general argument that cannabis today is different from cannabis in the past. This is unfortunate, because there can be little doubt that cannabis has changed, and that high potency cannabis represents an important and growing sector of the market in a number of major consumer countries.

The potency debate has generally hinged on measurements from police forensic testing. This information is collected for other purposes, not to create international comparable, time-series data. There is really no systematic programme monitoring cannabis potency levels anywhere in the world. Probably the closest is the United States Marijuana Potency Monitoring Project (MPMP), but this programme does not involve a random sampling of the cannabis available in the country.¹¹¹ From this core problem are derived several others, relating to terminology, sampling and more technical aspects of testing.

There are also complications related to the nature of cannabis itself. THC degrades over time, so the age of the sample and the conditions under which it was stored are highly relevant. The moisture content also varies greatly, and for this reason, samples seized on the street cannot be compared to samples taken during field eradication, unless the moisture levels are standardised.

Traditionally, potency has been framed in terms of either delta-9 THC content or total THC content,¹¹² without regard to other psychoactive cannabinoids. THC, however, is only one of a number of psychoactive chemicals in cannabis, and one, cannabidiol (CBD) in particular is believed to 'moderate' the effects of THC, promoting relaxation and possibly even having an anti-psychoactive effect. Accordingly, the growth of sinsemilla, which typically shows low levels of CBD, could be changing the nature of the cannabis experience. Where possible, it would be advisable to track both THC and CBD levels in future evaluations of 'potency'.

Since different laboratories do THC testing for different purposes, comparing findings is difficult. Differing techniques are evident in the fact that some Western European countries that source most of their cannabis

resin from the same area (in Morocco), such as Portugal and Italy, report dramatically different THC levels. Even within a given jurisdiction, techniques have improved over time. This makes comparing figures between countries or over time difficult.

Combining the forensic data with other information sources, however, gives good reason to believe that high-end cannabis is more potent than in the past and that this product is commanding a growing share of the market in many important consumer markets.

First, there can be little doubt that knowledge about the cultivation and use of cannabis as a drug has improved since the 1960s. The 'medical marijuana' providers in Canada are able to mass-produce 14 per cent THC herbal cannabis. While individual samples of similar or greater potency may have been found in the past, it is highly unlikely that anyone operating thirty years ago would have been able to approximate this performance. The sinsemilla technique, selective breeding for potency, more selective manicuring, a greater understanding of ripeness, curing, and storage techniques, and other improvements in cultivation technology have made it possible to produce far more potent product than was possible in the past.

But just because the technology is there does not mean that all cultivators use it. The vast bulk of cannabis grown throughout the world is still cultivated the traditional way. In many countries, growers lack the knowledge, the resources, and the incentive to produce better quality cannabis. The market for low potency product remains strong, and producing higher quality requires both more work and more input costs. Even if a cannabis farmer in a developing country wanted to improve potency, he would have to find a market for this product. Local consumers may not be able to afford his produce, and his international connections would be linked to established low-potency markets.

Thus, a higher potential potency does not necessarily mean an increase in the average potency consumed by users. In order to understand the real impact of the new cannabis technology in specific markets, the relative market shares of the high-end and low-end markets need to be observed across time.

The 2004 European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) study on cannabis potency in Europe is the best recent cross-national study of forensic information.¹¹³ The study cites estimates on the market share of four product types in Europe: imported herbal cannabis, cannabis resin, sinsemilla,

and domestic resin. Most cannabis consumers prefer one product or the other, so the herbal and resin markets should be seen as distinct, not agglomerated. Within the herbal market, data distinguishing between sinsemilla and imported cannabis were available for only three countries: the Netherlands, the United Kingdom, and Ireland.

- In the Netherlands, 67 per cent of the cannabis consumed is sinsemilla, 29 per cent imported resin, 3 per cent imported herbal, and 1 per cent domestic resin.
- In the UK, in contrast, sinsemilla holds only 15 per cent of the total market, but it holds 50 per cent of the herbal market. In other words, imported herbal also holds 15 per cent of the market, and imported resin 70 per cent. Other analysts suggest that as much as half the cannabis consumed in the UK might be produced domestically, most of which would be sinsemilla.¹¹⁴
- In Ireland, herbal cannabis is also evenly split between local sinsemilla and imports, with most of the market (90 per cent) being imported resin.

Thus, for the three European countries for which sinsemilla information was available, the sinsemilla market either equalled or exceeded the herbal import market.

The share of detected cannabis cultivation operations that are located indoors in the US has also increased in recent years, from 2 per cent indoor in 1985 to 7 per cent indoor in 2003, with the greatest change being seen between 1989 and 1992.¹¹⁵ Law enforcement sources confirm that indoor cultivation is as widespread as outdoor cultivation, and that the sinsemilla market is growing.¹¹⁶

In addition, Canada is playing an increasingly important role in cannabis imports to the US, contributing 20 per cent of the cannabis imported into the US in 2003.¹¹⁷ Between 1997 and 2000, some 78 per cent of cannabis production operations detected in British Columbia, the province that produces over 40 per cent of the detected cultivation operations in the country and a major supplier to the US, were indoors. The number of detected indoor operations tripled during the same time period.¹¹⁸ A slightly lower share of all operations detected in the country were indoors.¹¹⁹ Canadian authorities consider all the cannabis they test to be sinsemilla, and average potency levels were 9.6 per cent in 2003, compared to 7.4 per cent for US sinsemilla.¹²⁰

The trend has been towards larger and larger indoor operations, due in part to the growing involvement of organized crime groups in production.¹²¹ US sources estimate that Canada produces about 12 per cent of the cannabis consumed in the US (about 1,000 metric tons per annum).¹²² This would suggest Canadian sinsemilla imports alone should comprise at least 8 per cent of the American market.

Other countries have also shown a growing market for indoor, sinsemilla, high potency cannabis. In New Zealand, for example, the number of national survey respondents who had ever used 'skunk' increased from 10 per cent in 1998 to 14 per cent in 2001.¹²³ In the United Kingdom, survey research concludes that 'skunk' was the only type of herbal cannabis to improve its market share among regular users between 1994 and 1997, up just under 10 per cent during this time period.¹²⁴ In Australia, after many years of winning market share from both imports and a remarkable outdoor industry,¹²⁵ hydroponic (plants produced indoors in a nutrient bath rather than soil) production is now the most commonly detected method of cultivating cannabis.¹²⁶ In 2003, Hong Kong authorities noted for the first time the importation of 'buds' from the Netherlands.¹²⁷

Internationally, there appears to be a trend toward developed countries relying more on internal production and less on imports. In the United States, for example, the estimated share of cannabis that is grown domestically has increased dramatically in recent years. In 1986, it was estimated that one-sixth of cannabis consumed in the United States was produced within the country,¹²⁸ whereas more recent estimates place this at one third,¹²⁹ and the most recent assessment suggests that this trend is continuing.¹³⁰ Similarly, in Canada in 1985, only 10 per cent of the cannabis consumed was produced domestically,¹³¹ but by 2002, it was estimated that "well over half" was Canadian grown.¹³² In the United Kingdom, as noted above, an estimated 30 per cent of the cannabis used by regular users was home grown in 1997,¹³³ increasing to 66 per cent in 2005, and imports from Morocco, Netherlands, and India appear to have decreased.¹³⁴ In the Netherlands, the trend has been away from imported cannabis resin and towards domestically produced sinsemilla and cannabis resin. Even in Iceland, "Domestically cultivated marijuana has become increasingly competitive with imported marijuana, and current estimates indicate it makes up anywhere from 10 per cent to 50 per cent of the total cannabis market."¹³⁵

Part of this move toward domestic product is due to an increase in small-scale production for personal consumption. Belgian authorities report that production for personal consumption is on the increase in their country, and that some 70 per cent of the cultivation operations detected (258 in 2003) involved less than six plants.¹³⁶ While survey respondents may be willing to admit use of cannabis, they may be hesitant to admit cultivation, since this is generally regarded as a more serious (and ongoing) offence. Nonetheless, in New Zealand, a household survey found that 10 per cent of all current users grew at least some of their own supply.¹³⁷ The corresponding survey in Australia found just over 5 per cent grew their own supply.¹³⁸

The share of people cultivating for personal use is much higher among those who use the drug frequently. A survey of regular users in Australia found that two-thirds of respondents grew some cannabis for their own use, and nearly half grew all or most of the cannabis they used.¹³⁹ This tendency is not limited to areas with good conditions for growing cannabis, like Australia. In the United Kingdom, 63 per cent of a sample of regular users reported having grown the drug at some point in their lives, growing an average of 24 plants. They estimate that while only 30 per cent of the cannabis used by regular users in the United Kingdom was home-grown in 1997,¹⁴⁰ 66 per cent was home grown in 2005.¹⁴¹ If this is correct, a significant share of the cannabis used is produced and distributed free within the country. A study concurs, "...domestic production is on the increase and as much as half of the cannabis consumed in England and Wales may be grown here. Some cultivation is on a commercial basis, but much is on a small scale, for personal use or use by friends."¹⁴²

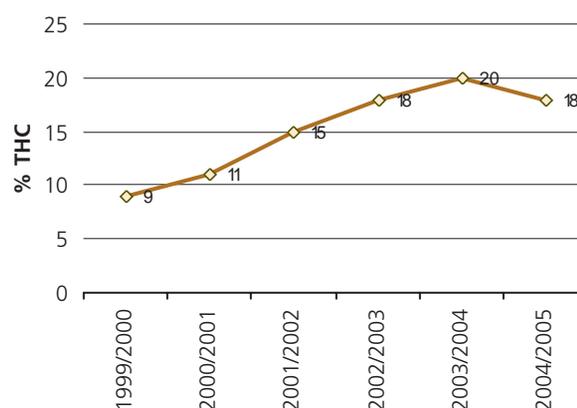
Research suggests that what these small growers do not use or give away, they often sell within their social circle. According to US national survey data, most (78 per cent) of those who say they bought the drug in the last year say they bought it from 'a friend'. In Australia, the figure is also over 70 per cent, with only 14 per cent buying from a dealer.¹⁴³ Even higher figures were found in an international comparative study of cannabis users in Bremen (80 per cent) and San Francisco (95 per cent).¹⁴⁴ Only 1 per cent of annual users polled bought from a stranger in Ireland.¹⁴⁵ While social networks may also deal in imported product, the job of transporting drugs across borders is more likely to be dominated by professionals. In contrast, those producing indoors on a small scale would very likely market their product through friends.

Thus, it would appear that the supply of high potency

cannabis is growing in developed countries as production becomes increasingly domestic and indoor, although demand remains for low potency products as well.

Within this growing share of the market, potent products appear to have been made much more potent in the last decade. The EMCDDA study and subsequent literature show quite dramatic increases in the sinsemilla potency in the United Kingdom (up from about 6 per cent in 1995 to over 12 per cent in 2002) and the Netherlands (up from about 9 per cent in 1999/2000 to about 16 per cent in 2001/2002).¹⁴⁶ More recent figures from the Netherlands drawn from about 60 annual samples of the most popular strains of nederwiet (sinsemilla) purchased from coffee shops show a doubling in potency between 1999 and 2003, with levels stabilizing at about 18 per cent since that time (Figure).

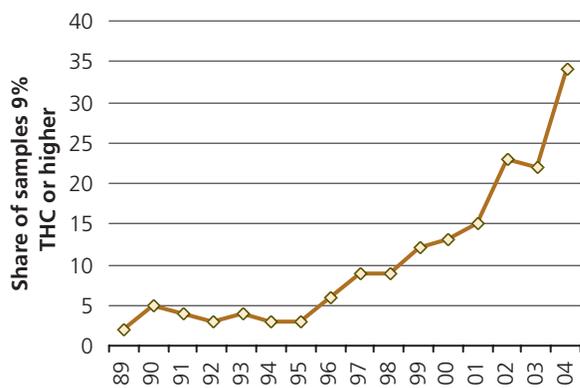
Fig. 10: Sinsemilla THC levels in the Netherlands



Sources: Niesink, RJM, Rigter, S, & Hoek, J., THC-concentraties in wiet, nederwiet en hasj in Nederlandse coffeeshops (2004-2005). Utrecht: Trimbos Institute, 2005.

In Germany, the European country with the largest sample base, no distinction is made between sinsemilla and low-grade cannabis. Despite this, aggregate herbal potency has been clearly going up very recently. In 1996, samples averaged about 5 per cent; in 2004, they were about 11 per cent.¹⁴⁷ This is very significant, as the EMCDDA estimates herbal cannabis commands 40 per cent of the growing cannabis market in Germany.

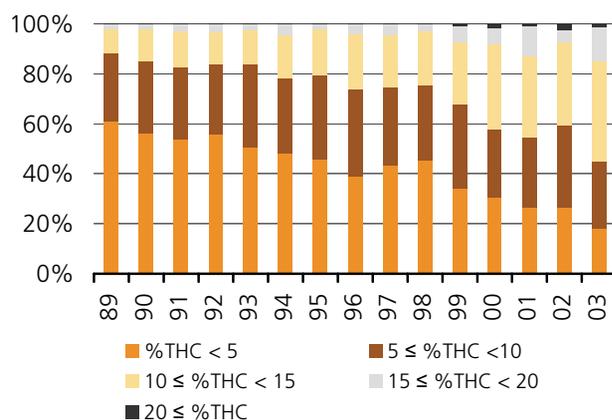
In the United States, virtually all cannabis seized by the agencies of the national government is tested by the Marijuana Potency Monitoring Project (MPMP) at the University of Mississippi, which has been in place for

Fig. 11: Share of MPMP samples testing above 9 per cent THC

Source: Marijuana Potency Monitoring Project (MPMP)

over 20 years. The trend generally reported is an aggregated one, including both sinsemilla and low potency products, but it has been unmistakably upward for some time. This trend strongly suggests an increased availability of high potency product since the mid-1990s. As in the Netherlands, the increase has been particularly pronounced since 1999.

In Canada, before the early 1980s, THC levels seldom reached above 1 per cent, but by the late 1990s they were over 6 per cent.¹⁴⁸ Declining shares of tested samples have less than 5 per cent THC and a growing share

Fig. 12: Canadian cannabis sample THC breakdown

Source: Adapted from Viau, R., L. Marro, M. Walker, Retrospective Examination of the THC Levels of Marijuana Seized in Canada, Second Technical Conference on Drug Control Research Vienna, July 19-21, 2004.

register above 10 per cent. Very high potency samples (above 20 per cent) remain relatively rare, but have certainly increased in share since 1999. These changes are partly attributed to changes in the make-up of samples admitted for analysis.

Thus, for every country where reliable data are available, it appears that sinsemilla is commanding a greater share of the herbal cannabis market, and that this sinsemilla has become dramatically more potent in the last decade. In summary, it would appear that the technological capacity to produce large amounts of high-potency cannabis has emerged in recent decades. This has serious implications for the developed countries where such product is consumed.

Impact on public health: Three reasons to worry

The growth of acute health episodes

The existence of higher THC products and the growth of the high potency market do not necessarily mean that more THC is being ingested. In theory, users could simply consume less. The onset of psychoactive effect for smoked cannabis is very rapid, so users should receive quick feedback on their levels of intoxication.

However, the existence of a more concentrated form of any drug does pose a risk, especially for novice users. A single 'hit' or two of extremely potent product may even catch experienced users off guard, since tolerance develops only with near daily use, and those accustomed to a particular consumption pattern may not adapt it sufficiently to take into account highly variable product strength. Cannabis is often consumed in groups, and social pressure may be a key factor in the amount consumed.

Measuring these effects is extremely difficult, but there are several indicators that the emergence of high-potency sinsemilla has resulted in more THC consumption. First, it would be expected that higher potency would result in smaller units of consumption, but evidence from several countries show that, if anything, the size of consumption units has increased. Second, there have been unexplained increases in the number of emergency room episodes associated with cannabis in the United States, and in the share of total treatment berths occupied by people seeking help with cannabis in both the US and in Europe.

One of the best data sets for evaluating the extent to which cannabis use contributes to acute medical prob-

lems comes from the United States. The Department of Health and Human Services' Substance Abuse and Mental Health Services Administration (SAMHSA) is responsible for collecting a range of important indicators about the state of substance abuse in the United States. These include the Drug Abuse Warning Network (DAWN), which records the number of cases in which medical staff from a representative sample of emergency room departments determined that presenting trauma was related to the use of legal or illegal drugs (referred to as 'mentions'), as well as deaths that coroners determine to be drug-related.¹⁴⁹ While there are very few deaths attributable to cannabis use, the number of cannabis-related emergency room episodes is substantial, and has risen over the years.

According to the medical professionals participating in the DAWN system¹⁵⁰, 'marijuana' (which includes cannabis resin) was a feature in 45,259 emergency room episodes in 1995. The number of mentions increased to 119,472 in 2003, a 164 per cent increase. Looking at these figures as rates, which would take into account the increase in population during this period, there were 47 mentions per 100,000 in 2002, an increase of 139 per cent over 1995. This increase is less than was seen for MDMA (767 per cent) but more than for cocaine (33 per cent) or heroin (22 per cent).

These figures would support the argument that cannabis emergency room admissions for cannabis have increased, and have increased at a rate disproportionate to most other drugs of abuse. But other SAMHSA data indicates that overall cannabis use levels also increased during this period. According to the National Survey on Drug Use and Health (NSDUH), the number of annual users of cannabis in the United States was 17,755,000 in 1995. This figure increased to 25,755,000 in 2002, an increase of 31 per cent.

Using these figures, it is possible to calculate the number of drug users per emergency room cannabis mention. In 1995, there was one visit for every 392 people who used the drug that year. In 2002, there was one visit for every 216 users, an increase of 55 per cent. This suggests that the share of total cannabis users who find themselves in an emergency room has increased.

However, when cannabis was mentioned, it was usually mentioned in combination with other drugs. In 72 per cent of the cases when cannabis was mentioned, other drugs were also mentioned. Thus, in only a minority of cases could it be clearly argued that cannabis was the only drug that might be involved in precipitating the

emergency room visit. But the share of "cannabis only" mentions has increased since 1995, when 78 per cent of the episodes where cannabis was mentioned also featured other drugs, which supports the notion that the drug on its own is becoming more problematic.

Those seeking emergency attention with a drug situation are further classified as to the exact cause of the emergency. In recent years, the most common reason for seeking emergency room attention for cannabis is an unexpected reaction to the drug. This is consistent with the kind of effect that would be expected with the increasing circulation of high potency cannabis.

The growth of rehabilitation demand

In addition to acute episodes, high potency cannabis could contribute to chronic problems in a variety of ways. It has been argued that increased potency represents increased addiction potential.¹⁵¹

Once again, the best data on treatment presentations comes from the largest cannabis market, the United States, in the form of the Treatment Episode Data Set (TEDS), which tracks some 1.5 million admissions to drug treatment in facilities that report to state administrative data systems.¹⁵² Unfortunately, using these figures to determine the extent to which drug users are finding their consumption to be problematic is complicated by the fact that large shares of people entering treatment do not do so voluntarily. Those apprehended in possession of cannabis (especially young people) are often given a choice in court: enter treatment via a diversion programme or go to jail.

According to TEDS, 111,418 people were admitted to treatment in 1993 with cannabis as their primary substance of abuse, comprising 7 per cent of the overall treatment population. In 1999, this number was 232,105, comprising 13 per cent of the treatment population. In other words, the number of cannabis admissions more than doubled in six years and, in addition, cannabis users nearly doubled their share of the treatment population. However, this increase took place at a time of renewed law enforcement focus on cannabis use: the number of cannabis arrests increased from 380,700 in 1993 to 704,800 in 1999, an increase of 85 per cent. During this same period of time, non-cannabis drug arrests increased by just 11 per cent.¹⁵³ Partly as a result, the share of cannabis users in treatment who were there due to a criminal justice referral increased during this period. It appears that changes in criminal justice policy were responsible for the bulk of the dramatic

increase between 1993 and 1999, but they do not account for all of it. With regard to the treatment data, therefore, the American case is inconclusive.

However, the United States is not alone in seeing an increase in the number and share of cannabis admissions to treatment. A similar trend is seen in Europe, where most countries have been liberalizing their cannabis policies, rather than emphasizing enforcement, in recent years. Treatment data within Europe are not uniform, so it is difficult to compare between countries. But it would appear that cannabis has increased its share of the treatment population in all European countries for which records are available in recent years. The increase is lowest in Greece and Italy, two countries that receive most of their herbal cannabis from Albania. Some of the countries where the market share of sinsemilla has increased, such as Germany and the Netherlands, have also seen dramatic increases in the treatment share for cannabis. Exceptions include the United Kingdom (believed to be using more sinsemilla but with modest increases in treatment share) on the one hand and Sweden (still largely consuming cannabis resin but tripling admission share) on the other.

These figures refer to the share cannabis holds of the treatment population, and thus documents that cannabis is becoming more problematic relative to other drugs. In most cases, this would also suggest an increase in absolute numbers of cannabis users seeking treatment.

Monitoring efforts in Australia are too new for time series data, but cannabis commanded 43 per cent of the non-alcohol treatment admissions (some 27,000 individuals), ahead of heroin and amphetamines, in 2002-2003.¹⁵⁵ Criminal justice referrals made up at least 37 per cent of this treatment population, however.¹⁵⁶ Independent of this data, it has been argued that an increasing number of people are seeking treatment for cannabis problems in centres used to treating alcohol and opiate dependence.¹⁵⁷ The reasons for this increase remain unclear.

In South Africa, cannabis has also grown in its share of admissions to treatment in the major urban centres, including Cape Town (4 per cent in 1996 to 11 per cent in 2004), Durban (10 per cent in 1996 to 25 per cent in 2004), and Gauteng (which includes Johannesburg and Pretoria, 11 per cent in 1998 to 19 per cent in 2004), as well as the rural province of Mpumalanga (14 per cent in 1999 to 24 per cent at the end of 2004).¹⁵⁸ Whether the treatment increase is possibly due to increased potency is unknown – South African cannabis is rarely tested for THC levels, and other factors, such as the declining age of the treatment population, may be responsible.

Thus although there simply is not enough data to prove that high potency cannabis is behind these trends, there is certainly a basis for a focused study of the association. As border controls stiffen, it is likely that a growing share of cannabis will be produced domestically, and in many countries this means indoors. But for most of the

Table 2: Share of primary cannabis users in the treatment populations of European countries

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | Increase |
|-------------|------|------|------|------|------|------|------|--------------------|
| Denmark | | 11 | | | | | 27 | 145% |
| Germany | | | 18 | | | | 30 | 66% |
| Greece | | | 6 | | | | 7 | 17% |
| Spain | | 4 | | | | | 11 | 175% |
| France | | 11 | | 14 | | | | 27% ¹⁵⁴ |
| Ireland | | 11 | | | 21 | | | 91% |
| Italy | | | 8 | | | | 9 | 12% |
| Luxembourg | | 4 | | | | | 11 | 175% |
| Netherlands | | | 11 | | | | 17 | 55% |
| Finland | | 18 | | | | | 23 | 28% |
| Sweden | 7 | | | | | | 30 | 329% |
| UK | | 8 | | | | | 10 | 25% |

Source: EMCDDA Annual Reports 1999 and 2002

world, cannabis remains what it has been for years. What is changing is our understanding of the risks associated with the drug.

Our understanding of the impact on health is changing

The widespread use of cannabis is clearly related to the public perception that smoking herbal cannabis is virtually harmless.¹⁵⁹ It is widely understood that, unlike other drugs, death by cannabis overdose is extremely unlikely and few people develop cannabis habits that force them into street crime or prostitution. Cannabis is not associated with violent behaviour in many countries, and its role in accidents is vague in the public mind. The stereotypical 'stoner' character has become celebrated in popular media as harmless and somewhat endearing. Moreover, claims of purported medical benefits of cannabis have created the impression that cannabis may actually be beneficial to health.

Despite the good press, cannabis remains a powerful drug. Cannabis use affects virtually every organ system of the body, from the central nervous system to the cardiovascular, endocrine, respiratory, and immune systems.¹⁶⁰ Its impact on the psyche and behaviour of users can be considerable. Few casual users of cannabis know that cannabis dependence is a major issue when they first start experimenting with the drug.

There have been many recent reviews of the literature on the health impacts of cannabis. This discussion uses the one published by World Health Organization in 1997¹⁶¹ as a point of departure, focusing on the major new findings since this review was conducted. The health effects of cannabis were also examined in a special double edition of UNODC's *Bulletin on Narcotics* in 1998.

Impact on the brain and behaviour

People smoke cannabis because it significantly changes their state of mind. The acute effects of cannabis use are an altered state of consciousness characterized by euphoria and relaxation, perceptual alterations, time distortion, and the intensification of ordinary sensory experiences.

But altered consciousness comes at a cost. Short-term memory and attention, motor skills, reaction time, and skilled activities are impaired while a person is intoxicated.¹⁶² This has a potential impact on driving skills and involvement in accidents. Moreover, cannabis has the ability to produce dysphoric reactions, including severe anxiety and panic, and paranoia.¹⁶³

In addition to its acute effects, cannabis use can produce long-term psychological problems. There is growing evidence that it can trigger latent psychosis and promote personality decompensation in diagnosed schizophrenics. Finally, some regular cannabis users find it difficult to stop using the drug, even when it is having adverse consequences for their lives.

Altered brain function can affect driving

The debate around cannabis and driving has been protracted. The World Health Organization states that there is sufficient consistency in the experimental evidence and studies among accident victims to conclude that there is an increased risk of accidents in people who drive when intoxicated with cannabis.¹⁶⁴ Subsequent research has pointed in both directions.¹⁶⁵

The short-term impact of cannabis on cognitive and psychomotor performance has been recognized for many years. The effects include the slowing of reaction time, motor incoordination, impairment in short-term memory, difficulty in concentration, and slower problem solving. The effects are dose-related but can be demonstrated after relatively small doses (5-10 mg THC), even in experienced users.¹⁶⁶ But studies have conflicted on whether this impairment affects driving performance, with some suggesting that those intoxicated on cannabis recognise their condition and drive more carefully in compensation.

Research in this area has been complicated by the way the drug is metabolised. THC is fat-soluble, and quickly passes out of the blood into the brain and other organs, where it and its metabolites can remain for extended periods of time before slowly being excreted. Thus, the detection of cannabis metabolites in urine only serves to prove that the subject has used cannabis at some time in the recent past, not that intoxication was indicated at the time of the testing. And, unlike alcohol, even blood tests are not always reliable measures of the level of intoxication, particularly if they measure metabolites instead of THC. Perhaps partly as a result, the more recent studies in this area reach conflicting conclusions.

On the other hand, surveys that established recent use of cannabis by directly measuring THC in blood showed that THC positives, particularly at higher doses, are about three to seven times more likely to be responsible for accidents in which they were involved as compared to drivers that had not used drugs or alcohol.¹⁶⁷ And laboratory studies of driving by subjects given known quantities of THC have repeatedly found a connection between cannabis intoxication and bad driving,

as THC impairs cognition, psychomotor function and actual driving performance in a dose related manner. The degree of performance impairment observed in experimental studies after doses up to 300 mcg/kg THC were equivalent to the impairing effect of an alcohol dose producing a blood alcohol concentration of 0.05 g/dl, the legal limit for driving under the influence in most European countries.¹⁶⁸

Progress in this debate might be assisted by standardising methodologies and finding more accurate ways of documenting current cannabis intoxication. One way of sidestepping the scientific problems is to ask the users themselves if they feel the perceptual distortions associated with cannabis consumption affect their driving. For example, one survey of regular cannabis users in Australia reported a quarter (25 per cent) of respondents felt their driving performance was impaired, reflexes and reaction times slowed, and their concentration affected when attempting to drive under the influence of cannabis.¹⁶⁹ The fact that over half of those polled in the national surveys on drug use in New Zealand say they never drive when under the influence of cannabis also demonstrates that cannabis users themselves feels that cannabis impairs their driving performance.¹⁷⁰

Adverse psychological effects

The ‘reefer madness’ discourse of the early anti-drug campaigns in the United States appears to have undermined the credibility given to official pronouncements on the mental health risks of cannabis. This is unfortunate, because it is becoming increasingly clear that cannabis use can have serious psychological consequences. In the last eight years, several major reviews of the psychiatric problems associated with cannabis use have been conducted.¹⁷¹

With regard to the acute effects of the drug it is clear that cannabis can cause some dysphoric effects when used in high doses, including panic and delusions and ‘cannabis psychosis’. In 1997, the World Health Organization found that the existence of such a disorder would require further research evidence. However, a recent review found that very high doses of cannabis can induce a brief psychosis, but this condition is extremely rare.¹⁷² In contrast, another report found that an appreciable proportion of cannabis users report short-lived adverse effects, including psychotic states, following heavy consumption.¹⁷³

With regard to long-term effects, several impacts have been hypothesised. One of the early attempts to describe the negative impact of cannabis on the mental state of

users is the so-called ‘amotivational syndrome’, a personality deterioration with loss of energy and drive to work.¹⁷⁴ Again, the World Health Organization was unable to confirm the existence of such a syndrome based on the research in 1997. The state of evidence on amotivational syndrome largely comprises uncontrolled studies of long-term cannabis users in various cultures.¹⁷⁵ Evidence to the contrary is seen in cultures where cannabis is traditionally consumed to increase work output, such as South Africa and Jamaica. Due to the lack of a strong evidence base, the validity of this diagnosis remains uncertain.¹⁷⁶ It is probable that it represents nothing more than ongoing intoxication in frequent users.¹⁷⁷

More worrying is the conflicting evidence around the claim that cannabis can either cause psychosis in vulnerable individuals or precipitate latent psychosis. The World Health Organization argues that there is clear evidence of an association between cannabis use and schizophrenia. One recent review of the literature determined that cannabis exposure is associated with an increased risk of psychosis, possibly by interacting with a pre-existing vulnerability for these disorders. A dose-response relationship was found between cannabis exposure and risk of psychosis, and this association was independent from potential confounding factors such as exposure to other drugs and pre-existence of psychotic symptoms.¹⁷⁸ Increased rates of psychotic symptoms were found to be associated with the development of cannabis dependence in young people (ages 18 and 21) in a longitudinal study of a birth cohort of 1,265 individuals in New Zealand, even when pre-existing symptoms and other background factors were taken into account.¹⁷⁹

Since some schizophrenics ‘self-medicate’ with cannabis, it can be difficult to determine the lines of causation. An association between use of cannabis in adolescence and subsequent risk of schizophrenia was reported in a follow-up study of Swedish conscripts. The authors later extended the follow-up period and identified additional cases. Between the two studies, 50,087 subjects participated. Cannabis was associated with an increased risk of developing schizophrenia, consistent with a causal relation.¹⁸⁰

Studies have also indicated that early use of cannabis is associated with the later development of psychosis. The Dunedin longitudinal study of adolescent cannabis use found that using cannabis in adolescence increases the likelihood of experiencing symptoms of schizophrenia in adulthood among psychologically vulnerable individuals. Moreover, the authors added that early cannabis

use (by age 15) confers greater risk for schizophrenia outcomes than later cannabis use (by age 18). This risk was specific to cannabis use, as opposed to use of other drugs.¹⁸¹

Aside from full-blown psychosis, cannabis is associated with other forms of mental illness. One study found that the prevalence of co-morbid psychiatric disorders and the severity of depressive and anxious symptoms increased progressively with the degree of involvement with cannabis.¹⁸²

A link between cannabis and major depression was found in an epidemiological study of 6,792 young adults in the USA. The risk of major depression was moderately associated with the number of occasions of cannabis use and with more advanced stages of cannabis use.¹⁸³ These data were later confirmed in a review of cohort studies and well-designed cross-sectional studies in the general population. A modest but significant association was found between early-onset, regular cannabis use and later depression. On the other hand, some evidence was also found of an increased risk of later cannabis use among people with depression. This would support the hypothesis that people dealing with mental illness may turn to cannabis or other drugs in an attempt at self-medication. Little evidence was found for an association between depression and infrequent cannabis use.¹⁸⁴

Furthermore, research based on the Christchurch cohort study (a 21-year longitudinal study of a birth cohort of 1265 New Zealand children) concluded that a significant link exists between the frequency of cannabis use and negative psychosocial outcomes, including property/violent crime, depression, suicidal behaviours and other illicit drug use. Especially, for the measures of crime, suicidal behaviours and other illicit drug use there was evidence of age-related variation in the strength of association with cannabis use, with younger users (14-15 years old) being more affected by regular cannabis use than older regular users (20-21 years old). The association between cannabis use and depression did not vary with age.¹⁸⁵

A significant association between cannabis use and poor mental health was found in adolescents and young adults during the Dunedin long-term prospective study. Cannabis use and poor mental health were linked to low socio-economic status, a history of behaviour problems in childhood, and low parental attachment in adolescence. Mental disorder at age 15 led to a small but significantly elevated risk of cannabis use at age 18; by contrast, cannabis use at age 18 elevated the risk of

mental disorder at age 21. The authors conclude that the primary causal direction leads from mental disorder to cannabis use among adolescents and the reverse in early adulthood. In contrast, alcohol use and cigarette smoking had independent associations with later mental health disorders.¹⁸⁶

Current heavy cannabis use appears to have a negative impact on intelligence. In one study, IQ scores were examined before, during and after cessation of regular cannabis use to determine any impact of the drug on this measure of cognitive function. It was found that current cannabis use was significantly correlated in a dose-related fashion with a decline in IQ over the ages studied. Current cannabis use had a negative effect on global IQ score only in subjects who smoked five or more joints per week (heavy users). A negative effect was not observed among subjects who had previously been heavy users but were no longer using the substance. Smoking at least five joints weekly should not be interpreted as a definitive threshold, as subjects were at low risk for other factors that could have a negative synergistic effect on IQ score. Authors conclude that cannabis does not have a long-term negative impact on global intelligence, however they also identified the need for further investigation of the cognitive consequences of both current and previous cannabis use, especially a residual cannabis effect in more specific cognitive domains such as memory and attention.¹⁸⁷

Cannabis use in early adolescence appears to have the ability to interfere with the normal development process. For example, one study pointed out that long-term cannabis users with early age of onset of their drug consumption (age 14 to 16) showed a specific deficit in visual scanning. A group of cannabis users (17 participants) compared to control group (20 participants) showed less effective search behaviour, including longer response times and more fixations at about the same error level. In sum, the results point to two loci of adverse effects: impairment in visual short-term memory, and less effective visual processing at a more strategic, top down controlled level.¹⁸⁸

Furthermore, an early age of onset, rather than other potential predictors of test performance like present age, degree of acute intoxication or cumulative toxicity, was found to be the only factor predicting enduring effects on specific attentional functions in adulthood. Visual scanning undergoes a major maturation process around age 12-15 years and it is known to react specifically and sensitively to cannabinoids. A comparison of a group of young adult regular users of cannabis only with a group of non-users on a battery of tests of selective attention,

one of which is a test of visual scanning attention, showed that performance of cannabis users was selectively worse on this test, and the only feature that correlated with this impairment was the age at which adolescents began to use cannabis. Apparently vulnerable periods during brain development exist that are subject to persistent alterations by interfering exogenous cannabinoids.¹⁸⁹

Cannabis and aggression

The argument is made by many that cannabis is a “soporific” and therefore the historical associations the drug has with violence are unfounded. However, this position seems to underestimate the importance of ‘set and setting’ in understanding the impact of any drug. Research has illustrated that the effects of a drug are not simply a product of its chemistry, but rather the interaction of this chemistry with the user’s situation, mindset and his immediate environment when taking the drugs. So, while in the Western paradigm, cannabis is seen as drug inducing levity and sloth, this may not be the only interpretation that could be given to its physiological effects.

Depending on the dose, cannabis is generally classed as an ‘hallucinogen’, not a sedative or depressant. In many species the behavioural actions of low doses of delta-9 THC are characterized by a unique mixture of depressant and stimulant effects in the central nervous system. Heart rate is raised, body temperature drops, and thought processes are disturbed, for better or worse.¹⁹⁰ Some users refer to cannabis as a ‘mood enhancer’.

There may also be a chemical basis for differing views of the subjective effects of cannabis on aggression. In South Africa to this day, African people see cannabis as a stimulant, which eases labour, fuels creativity, and can fuel violence.¹⁹¹ One study notes that South African cannabis smokers seem to be particularly prone to psychosis with hypomanic features.¹⁹² The cannabis native to this area is considered a pure sativa, with very little CBD (see Annex 1 for more on this cannabinoid),¹⁹³ which is believed to moderate the stimulant effects of the drug,¹⁹⁴ and which may possess anti-psychotic properties.¹⁹⁵ It may be that more attention needs to be paid the variability of the cannabis plant before generalizing about its subjective effects.

There is little in the Western scientific literature to support the contention that cannabis is strongly associated with violence, however. There is some research that does find a link between cannabis and violent crime. While these studies fall far from demonstrating that cannabis

and violence are deeply linked, they do contradict the view that cannabis intoxication makes violence unthinkable.

New evidence for the gateway hypothesis?

One of the perennial debates surrounding the impact of cannabis is the so-called ‘gateway’ hypothesis: cannabis opens the door to the subsequent use of other drugs. Much of the early work in this area suffered from the *post hoc ergo propter hoc* logical fallacy. The fact that many users of other drugs report first using cannabis does not demonstrate a causal link between the two behaviours, and even a cursory look at the survey data illustrates the fact that most people who try cannabis do not go on to use other drugs.

More sophisticated recent studies indicate there may be more to this argument than its early incarnations suggested, however. One remarkable twin study was conducted in Australia. A national volunteer sample of 311 young adult identical and fraternal same-sex twin pairs was assembled. In each case, one twin had used cannabis before 17 years, while the other had not. Individuals who used cannabis by age 17 years were 2.1 to 5.2 times more likely than their co-twin to have experienced other drug use, alcohol dependence, and drug abuse/dependence. Controlling for known risk factors had only negligible effects on these results. The authors conclude that associations between early cannabis use and later drug use and abuse/dependence cannot solely be explained by common predisposing genetic or shared environmental factors. They argue that association may arise from the effects of the peer and social context within which cannabis is used and obtained. In particular, early access to and use of cannabis may reduce perceived barriers against the use of other illegal drugs and provide access to these drugs.¹⁹⁶

A good share of cannabis users find that they cannot stop

Cannabis is not popularly associated with addiction. Traditionally, cannabis was regarded as a non-addictive drug because of the lack of observed physiological withdrawal symptoms. But the terminology around addiction changed with the publication in 1994 of the American Psychiatric Association’s version four of its Diagnostic and Statistical Manual (DSM-IV). Rather than “addiction” the DSM-IV refers to “substance dependence,” a condition that requires no physical withdrawal symptoms. The emphasis is now on the inability to end use despite the desire to do so and the problems that use causes in the lives of the dependent

person.¹⁹⁷ At the same time, new research indicated that heavy cannabis users do experience a clinically significant withdrawal syndrome, although its effects appear to be relatively mild.

The World Health Organization (WHO) cites research indicating that about half of those who use cannabis daily will develop dependence, which is roughly consistent with these findings. WHO also notes that the low number of users presenting for treatment relative to the size of the user population suggests that there is a high rate of remission even in the absence of treatment.¹⁹⁸

A 2002 review of clinical and research experience concluded there is strong evidence demonstrating that cannabis can and does produce dependence. Clinical and epidemiological studies indicate that cannabis dependence is a relatively common phenomenon associated with significant psychosocial impairment.¹⁹⁹

One comparative review of drug dependence risk found an estimated 9 per cent of lifetime users will develop cannabis dependence at some point. This risk, however, is less than many other drugs, including legal drugs. It is estimated that 15 per cent of alcohol users, 23 per cent of opiate users, and 32 per cent of tobacco users will develop dependence on the drug.²⁰⁰

Of the 9 per cent of those who try cannabis and go on to develop dependence, it is estimated that 80 per cent of these people will not seek treatment.²⁰¹ Despite this, globally, more people receive treatment for cannabis than for any other illicit drug group besides heroin. Just under a million people participate in rehabilitation programmes every year for help with their cannabis problems in the United States alone. As discussed above, the exact numbers may be misleading, because often convicted users may be given a choice between jail time and treatment. But even in countries where this policy does not hold, large shares of the total treatment population say their primary drug is cannabis.²⁰² In a number of African countries, cannabis exceeds even alcohol in demand for treatment.

Impact on the unborn

The World Health Organization points out that research in this area is complicated by sampling issues and questionable self-report data. Despite these, they conclude that there is reasonable evidence that cannabis use during pregnancy leads to reduced birth weight, possibly due to the same mechanism as tobacco smoking, foetal hypoxia. They conclude that there is little evi-

dence to support the idea that cannabis smoking causes chromosomal or genetic abnormalities or birth defects. Most studies have confirmed the WHO conclusion by finding no relationship with either minor or major morphologic abnormalities.²⁰³ However, the Atlanta Birth Defects Case-Control Study was used to identify 122 isolated simple ventricular septal defects (VSD) cases and 3029 control infants born during the period 1968 through 1980 in the metropolitan Atlanta area. Data on alcohol, cigarette, and illicit drug use were obtained through standardized interviews with mothers and fathers. A two-fold increase in risk of isolated simple VSD was identified for maternal self- and paternal proxy-reported cannabis use. Risk of isolated simple VSD increased with regular (three or more days per week) cannabis use. This is the first study to identify an association between maternal cannabis use and VSD in offspring.²⁰⁴

Three case-control studies have found associations between cannabis use during pregnancy and increased risk of cancer in children. The mothers of children with acute non-lymphoblastic leukaemia were 11 times more likely to have used cannabis before and during pregnancy than were mothers of controls.²⁰⁵

Mild but significant cognitive impairment in the offspring of mothers who smoked cannabis during pregnancy were found in the Ottawa Prospective Prenatal Study.²⁰⁶ These data were confirmed through other studies. Prenatal cannabis use was significantly related to increased hyperactivity, impulsivity, and inattention symptoms at age 6²⁰⁷ and age 10.²⁰⁸ Furthermore it had a significant effect on academic performance: learning and memory of 10-year olds²⁰⁹ and deficits in reading, reading comprehension, spelling, and overall lower rating on the teachers' evaluations of the children's performance.²¹⁰

A follow-up study by of the same group between the ages of 13 and 16 indicated that those who had been exposed to cannabis *in utero* had poorer performance on tasks involving visual memory, analysis and integration.²¹¹

Cannabis smoking is not good for the lungs

As the World Health Organization concluded, smoking cannabis is not good for the lungs. Moreover, as cannabis smokers inhale more deeply, smoking a joint results in exposure to significantly greater amounts of combusted material per inhalation than smoking a tobacco cigarette. Of course, most cannabis users con-

sume fewer cigarettes than most tobacco smokers, but this may not be the case with those classified as ‘chronic’ consumers above.

Daily cannabis smoking has been clearly shown to have adverse effects on pulmonary function and produce respiratory symptomatology (cough, wheeze, and sputum production) similar to that of tobacco smokers.²¹² Several studies have demonstrated that, even after limited exposure to cannabis smoke, airway inflammation develops. Examination of the lungs of cannabis smokers who smoked an average of only a few joints per day showed the same degree of airway injury as that detected in tobacco smokers who smoked 20 to 30 cigarettes per day. This underscores the importance of deep inhalation in enhancing the relative injury caused by cannabis smoke.²¹³

Cannabis smoke is also a potential cause of cancer because it contains many of the same carcinogenic substances as cigarette smoke. A review of the basic science work concluded that the evidence clearly demonstrated the ability of cannabis smoke to produce mutations and cancerous changes.²¹⁴ In a recent review of all of the current evidence, one study concludes that there are good grounds for believing that chronic smoking of cannabis carries a significant risk of cancer in aerodigestive tract and lung.²¹⁵

Cannabis is not good for people with heart problems

Acute cardiovascular effects of cannabis are dose-dependent tachycardia, which can lead to increased cardiac output and is generally associated with a mild increase in blood pressure. At high doses, sympathetic activity is inhibited and parasympathetic activity increased, leading to bradycardia and hypotension.²¹⁶ The cardiovascular effects of cannabis are not associated with serious health problems for most young, healthy users, although occasional myocardial infarction, stroke, and other adverse cardiovascular events are reported.²¹⁷

Cannabis is not good for health

As noted above, the fact that the therapeutic effects of cannabis are being researched and legal changes are being made to accommodate this work may have obscured one simple fact: cannabis use is not good for health.

- According to a number of studies and many users, cannabis smoking impairs one’s ability to drive a

car and perform complex operations requiring motor skills.

- A significant share of cannabis users (about a fifth, according to one study) have experienced unwanted psychic effects during cannabis intoxication, including panic attacks, paranoia, and ‘psychotic symptoms’, and this risk of this happening may be increased by the growing availability of high potency cannabis.
- Numerous studies find an association between cannabis use and psychosis, and this effect is also likely to be influenced by the potency of the cannabis consumed.
- Despite early claims to the contrary, cannabis dependence is a reality: many people who use cannabis (several studies indicate just under 10 per cent) find it difficult to stop, even when it interferes with other aspects of their lives, and more than a million people from all over the world enter treatment for cannabis dependence each year.
- Research indicates that younger users, whose brains are still developing, may be especially vulnerable to the negative effects of cannabis.
- Cannabis smoking is bad for the lungs for all the same reasons that tobacco smoking is.
- There appear to be significant risks associated with prenatal exposure to cannabis and the effects of cannabis on the cardiovascular system.

Whether these negative effects are greater or lesser than other substances, including legally available substances, is of little relevance to the users whose lives are impacted by them. Despite its normalization in some countries and its occasional celebration in popular culture, it should be noted that cannabis is a powerful drug that has recently become more powerful in many parts of the world.