CHAPTER 1  HOW MARIJUANA AFFECTS HEALTH
Fact file: Cannabis 1
Cannabis statistics 3
Cannabis laws in Australia 5
Synthetic cannabis facts 6
Synthetic cannabis laws in Australia 8
Cannabis use and health 10
Cannabis and psychotic illness 17
Remind me again, how does cannabis affect the brain? 19
Does cannabis cause mental illness? 21
Is marijuana less dangerous than alcohol? 23
Cannabis and dependence 25

CHAPTER 2  MEDICAL CANNABIS DEBATE
The use of cannabis for medical purposes 27
The origins of cannabis 34
Medical cannabis around the world 35
Why medicinal cannabis 36
From farm to pharmacy: regulating medicinal cannabis in Australia 37
Latest developments on medical marijuana in Australia 39
Trials a step forward for medicinal cannabis but what comes next? 41
Medical cannabis: Norfolk Island decision sparks renewed calls to legalise drug for Australian patients 43
What needs to happen now to get medicinal cannabis to those who need it? 44
Is the medical marijuana debate even worth having? 46
Old dope, new tricks: the new science of medical cannabis 47
Exploring issues – worksheets and activities 49
Fast facts 57
Glossary 58
Web links 59
Index 60
Marijuana and Health is Volume 401 in the ‘Issues in Society’ series of educational resource books. The aim of this series is to offer current, diverse information about important issues in our world, from an Australian perspective.

**KEY ISSUES IN THIS TOPIC**

Cannabis, or marijuana, is the most widely used illegal drug in Australia, especially by young people. Marijuana is a potent and complex drug with a number of properties which can have applications for both recreational and medical purposes. Its known side effects include damage to physical and mental health and dependence.

What exactly are the harms of recreational marijuana use, and how are its use, cultivation, and possession currently dealt with under Australian laws? What are the potential medicinal benefits in relation to relieving suffering for people with chronic and terminal illness? And what are the legal obstacles in Australia to introducing medicinal use, while at the same time banning it from recreational use and supply?

This book explores the facts about cannabis use, looking at the drug’s known side effects and potential medical benefits. Can cannabis help as much as it can harm?

**SOURCES OF INFORMATION**

Titles in the ‘Issues in Society’ series are individual resource books which provide an overview on a specific subject comprised of facts and opinions.

The information in this resource book is not from any single author, publication or organisation. The unique value of the ‘Issues in Society’ series lies in its diversity of content and perspectives.

The content comes from a wide variety of sources and includes:

- Newspaper reports and opinion pieces
- Website fact sheets
- Magazine and journal articles
- Statistics and surveys
- Government reports
- Literature from special interest groups

**CRITICAL EVALUATION**

As the information reproduced in this book is from a number of different sources, readers should always be aware of the origin of the text and whether or not the source is likely to be expressing a particular bias or agenda.

It is hoped that, as you read about the many aspects of the issues explored in this book, you will critically evaluate the information presented. In some cases, it is important that you decide whether you are being presented with facts or opinions. Does the writer give a biased or an unbiased report? If an opinion is being expressed, do you agree with the writer?

**EXPLORING ISSUES**

The ‘Exploring issues’ section at the back of this book features a range of ready-to-use worksheets relating to the articles and issues raised in this book. The activities and exercises in these worksheets are suitable for use by students at middle secondary school level and beyond.

**FURTHER RESEARCH**

This title offers a useful starting point for those who need convenient access to information about the issues involved. However, it is only a starting point. The ‘Web links’ section at the back of this book contains a list of useful websites which you can access for more reading on the topic.
CHAPTER 1
How marijuana affects health

FACT FILE: CANNABIS

Cannabis is the most commonly used illegal drug in Australia, but how does it affect your health? This fact file is reproduced courtesy of ABC Health & Wellbeing

Everybody knows that heroin is extremely bad for you. Most people would say that cocaine, ecstasy and LSD are too. But what about cannabis?

It’s a fair question, because cannabis, or marijuana, is the most widely used illegal drug in Australia, especially by young people.

According to a survey conducted by the Australian Institute of Health and Welfare, 35 per cent of the Australian population have used cannabis at least once. The health issues related to using cannabis tend to be overshadowed by the arguments about whether cannabis should be legal or not.

Those who argue it should be legalised argue that it’s no more dangerous than alcohol. Those who don’t think it should be legalised point to evidence that it can cause lung damage, brain damage and psychosis.

What is it?

Cannabis sativa. Cannabis is derived from the cannabis plant (Cannabis sativa). Those who use it know it by a variety of names, including marijuana, dope, grass, pot, weed and mull.

The predominant active chemical in cannabis is THC (delta-9-tetrahydrocannabinol); the flowering heads of the plant have higher THC levels than the leaves. The drug is usually ingested into the body by smoking the dried heads and leaves of the plant, or the resin (a gum secreted by the plant known as hashish or hash). Cannabis can also be added to food and eaten.

When under the influence of the drug people experience alterations of mood and perception. These can be mildly pleasant or disorientating and disturbing, depending on the dose and on the experience of the user.

Cannabis can:

• Increase perception of colour, sound, smell, taste and other sensations.
• Make users feel happy, relaxed, and less inhibited.
• Alter perception of time and space, often causing the user to think they are experiencing profound ideas or insights.
• Increase the appetite, leading to a craving for chocolate or junk food.

There are some physical effects too:

• Cannabis decreases coordination and balance, making it dangerous to drive or operate machinery.
• Other common immediate effects include increased heart rate, low blood pressure, faintness and reddened eyes.
• There also can be a ‘hangover’ effect – drowsiness and poor coordination – lasting a couple of hours.
All these effects increase as the dose increases. If someone uses too much cannabis, or smokes a stronger batch than they're used to, they can have a bad time, becoming fearful, confused and paranoid. There isn't really anything that can be done except wait until the effects wear off, preferably in the company of another person.

Unlike heroin and cocaine, there have been no known deaths from an overdose of cannabis.

**Is it safe?**

Like alcohol and other drugs, occasional use of small quantities of cannabis is unlikely to cause any permanent health damage, except those associated with intoxication such as a motor vehicle accident.

But use it often, over a long period of time, and it’s a different story. Here’s how it can damage your health:

- **Cannabis damages your airways.** Cannabis cigarettes have more tar than tobacco, and smokers often inhale deeply, holding the smoke in the lungs longer to increase the effects of the drug. Smokers have increased susceptibility to chest infections like bronchitis (which then take longer to clear up), and a greater chance of developing chronic bronchitis. If cannabis and tobacco are combined, the risk is greater still, and the user probably also has a greater risk of developing lung cancer than someone who only smokes tobacco.
- **It saps your energy.** Some regular users report that they have less energy and motivation than people who don’t use the drug, and their performance at work or school suffers accordingly. When these users stop smoking, their energy and motivation usually returns.
- **It impairs your mental performance.** Regular cannabis use (using the drug daily, and perhaps more than weekly in younger users) diminishes a user's concentration, memory and the ability to learn. Even after stopping use, these effects can last for several months. Among those who begin cannabis use in their early teens the diminished cognitive function appears to be irreversible.
- **It can affect your sex hormones.** For a few hours after use, cannabis can depress sperm production in men. It’s also been associated with mild menstrual irregularities in women. Some long-term regular users report reduced sex drive.
- **It can affect your mental health.** (see below).

How much do you have to use before you experience those negative effects?

There isn’t a clear answer to this. For some users, such as those who are younger or have a history of serious mental illness, even weekly use may be too much.

It’s not a good idea to use the drug at all if you’re breastfeeding or pregnant. Women who smoke during pregnancy give birth to smaller, lighter babies than those who don’t. The same is probably true for people with schizophrenia and heart disease – cannabis can worsen the symptoms of both.

**Cannabis and mental illness**

There’s a lot of debate about whether cannabis use can cause psychotic illnesses like schizophrenia. This debate stems from the observation that people with schizophrenia are twice as likely to use cannabis compared to the general population. So does cannabis cause psychosis, or do people with psychosis use cannabis as a result of their illness?

The evidence seems to suggest that cannabis use is one of many factors that can combine to cause psychosis, but the mechanism by which this occurs is still far from clear. Other factors probably include your genetic predisposition to developing a psychotic illness. Research suggests that the younger you start using cannabis, the greater your risk of developing a psychotic illness, but that cannabis alone does not cause psychosis, and that you can still have a psychotic episode without having used cannabis.

A 2011 study found that cannabis use can hasten the onset of a psychotic illness by up to three years, and that delaying or stopping cannabis use could not just delay but even prevent some cases of psychosis. In fact, some researchers have suggested that stopping cannabis use could prevent about eight per cent of schizophrenia.

There is also debate about whether cannabis use can lead to other mental illnesses such as depression...
and anxiety, but the evidence is unclear. One study found a modest association between using cannabis as an adolescent and experiencing depression as an adult but there was no strong evidence to suggest that it is a cause of depression.

Dependence
Regular users of cannabis often develop a tolerance to the drug – in other words, they need to smoke more over time to get the same effect.

About one in 10 of those who have tried cannabis become dependent on it. This involves physical symptoms such as tolerance and withdrawal and the most common psychological symptoms of craving and inability to control use.

The drug subtly alters the user’s brain chemistry: if they suddenly stop smoking it they experience withdrawal symptoms (sleep disturbance, irritability, anxiety and sweating) which can last about a week.

Treatment
Private and government-run drug clinics and centres offer rehabilitation and treatment programs using individual counselling, group therapy, medication and withdrawal programs or a combination of these approaches, depending on the clinic and the user.

Some of them aim to stop clients using the drug altogether. Others recognise this isn’t always possible and focus on reducing the amount that people use.

Drug tests
Most routine drug screening tests can detect THC

Like alcohol and other drugs, occasional use of small quantities of cannabis is unlikely to cause any permanent health damage, except those associated with intoxication such as a motor vehicle accident.

CANNABIS STATISTICS

National
- 34.8% of Australians aged 14 years and over have used cannabis one or more times in their life.
- 10.2% of Australians aged 14 years and over have used cannabis in the previous 12 months.

Young people
- Young Australians (aged 14-24) first try cannabis at 16.7 years on average.
- 14.8% of 12-17 year olds have tried cannabis – it is the most commonly used illicit drug among this age group.

REFERENCES

See more at: www.druginfo.adf.org.au/topics/quick-statistics#sthash.Cb1weO0id.dpuf

and its metabolites in blood, saliva and urine. It is stored in fatty tissue, so can be detected for quite a while after use in urine tests: three to five days after a one-off joint (cigarette), or in the case of a heavy user, up to 30 days after stopping the drug.

Medical use of cannabis

Although its use for this purpose is currently illegal in Australia, there are suggestions that cannabis could help relieve the symptoms of certain medical conditions such as Multiple sclerosis, chronic pain, wasting due to HIV or cancer, and nausea caused by chemotherapy.

Even though the majority of people in Australia support a clinical trial of using cannabis to treat medical conditions and a change in legislation to allow the medical use of cannabis, there is a lack of in-depth clinical research into the therapeutical potential of cannabis. A survey of Australians using cannabis (illegally) for medical purposes (including chronic pain, depression, arthritis, persistent nausea and weight loss) reported that these users perceived cannabis to provide relief of their symptoms.

While the main stumbling block is its illegality, other issues surrounding the medical use of cannabis include the difficulty in obtaining a consistently reliable dose through smoking the natural product, the potential harms associated with smoking and side effects of smoking including the ‘high’ caused by THC and a dry mouth. There is also a lack of convincing evidence that it is superior to other available drugs.

There is a pharmaceutical version of cannabis called Sativex, a mouth spray containing THC and other cannabis extract called cannabidiol. Sativex is registered for use in several countries as a treatment for neuropathic pain in people with Multiple sclerosis. Although it is not currently approved for use in Australia, a trial of the drug in cancer patients with pain is currently under way.

Reviewed by Professor Jan Copeland and Mr Paul Dillon from the National Cannabis Prevention and Information Centre.

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CANNABIS LAWS IN AUSTRALIA

Cannabis use and possession is illegal all over Australia, but the penalties vary greatly from state to state, according to this fact box report from SBS News.

Both New South Wales and Victoria are moving toward clinical trials for medical use of cannabis. On the Federal level the Greens are pushing a private members bill to allow cannabis to be used to treat a range of ailments. But what do the current laws says about use and possession of marijuana?

Some states offer diversion programs despite cannabis being a criminal offence, but these programs are only available to non-violent offenders.

NEW SOUTH WALES
Any cannabis offence is considered a criminal offence in NSW, which is one of the toughest states on drug use. Offenders caught with up to 15 grams of cannabis may be cautioned by police, who will also give them information about the harms associated with it and a number to call for more advice. The offender can be cautioned twice before charges are laid.

AUSTRALIAN CAPITAL TERRITORY
The ACT has decriminalised minor cannabis offences, but the drug is still considered illegal. A civil penalty system for the possession of ‘small amounts’ of cannabis was introduced in 1993. Offenders caught with up to two non-hydroponic cannabis plants, or up to 25 grams of marijuana are fined $100 fine and given 60 days to pay. Criminal charges are not laid, and offenders can choose to attend a treatment program instead of paying the fine.

SOUTH AUSTRALIA
South Australia decriminalised minor cannabis offences in 1987 and was the first state to do so. Residents found with up to 100 grams of marijuana, 20 grams of hash (resin), one non-hydroponic plant or cannabis smoking equipment are fined $50 to $150 and given 60 days to pay.

VICTORIA
Cannabis is illegal and criminal in Victoria, but drug offences there are tried in a different court. As in the other non-decriminalised states, it’s up to the arresting police officer to decide whether to charge the drug user, or refer them to a ‘diversion’ program aimed at informing and aiding them. Anyone carrying less than 50 grams of cannabis in Victoria can be directed to an education program, but – as in NSW – that option is only available to each offender twice before charges are laid.

TASMANIA
Under Tasmanian law, offenders found with up to 50 grams of cannabis can be cautioned three times in ten years, with different procedures at the time of each caution. Information and referral is provided on the first caution and an intervention is implemented with the second. On the third and final caution, the offender is assessed for dependence and sent for intervention or treatment.

NORTHERN TERRITORY
Under Northern Territory law, adults found in possession of:
- Up to 50 grams of marijuana
- One gram of hash oil
- 10 grams of hash or cannabis seed
- Or two non-hydroponic plants
are likely to be fined $200 and given 28 days to pay their fine. If they do this, they are not likely to face a criminal charge.

WESTERN AUSTRALIA
Alongside NSW, WA has the nation’s toughest stance on drug offences. In 2004 it introduced civil penalties for cannabis possession but this was overturned with a change of government in 2008. Since reforms in August 2011, offenders who have no prior cannabis offences but are caught with no more than 10 grams of harvested cannabis and/or a used smoking implement must attend a Cannabis Intervention Session within 28 days or receive a conviction. All cannabis cultivation (planting, watering or tending to even one marijuana plant) offences attract a criminal conviction.

QUEENSLAND
Even though possession and use of cannabis is a criminal offence in Queensland, offenders caught with up to 50 grams of cannabis must be first offered a drug diversion program. This includes a mandatory assessment and brief intervention session. Police must offer this but only one offer of diversion is allowed per person.

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WHAT IS SYNTHETIC CANNABIS?
Synthetic cannabis is a new psychoactive substance that is designed to mimic or produce similar effects to cannabis. It has been sold online since 2004. Synthetic cannabis is produced with man-made chemicals that create similar effects to delta-9 tetrahydrocannabinol (THC), the active ingredient in cannabis. However, reports suggest it also produces additional negative effects. These powdered chemicals are mixed with solvents and added to herbs and sold in colourful, branded packets. The chemicals usually vary from batch to batch as manufacturers try to stay ahead of the law, so different packets can produce different effects even if the name and branding on the package looks the same.

Other names
Synthetic cannabis is marketed under different brand names.
Spice was the earliest in a series of synthetic cannabis products sold in many European countries. Since then a number of similar products have been developed, such as Kronic, Northern Lights, Mojo, Lightning Gold, Lightning Red and Godfather.
Synthetic cannabis is also marketed as aphrodisiac tea, herbal incense and potpourri.

How is it used?
It’s most commonly smoked and sometimes drunk as a tea.

EFFECTS OF SYNTHETIC CANNABIS
There is no safe level of drug use. Use of any drug always carries some risk. It’s important to be careful when taking any type of drug.

Synthetic cannabis affects everyone differently, based on:
- Size, weight and health
- Whether the person is used to taking it
- Whether other drugs are taken around the same time
- The amount taken
- The chemical that is used and its strength (varies from batch to batch).

Synthetic cannabis is relatively new, so there is limited information available about its short and long-term effects including how safe or unsafe it is to use. However, it has been reported to have similar effects to cannabis along with some additional negative and potentially more harmful ones including:
- Fast and irregular heartbeat
- Racing thoughts
- Agitation, anxiety and paranoia
- Psychosis
- Aggressive and violent behaviour
- Chest pain
- Vomiting
- Acute kidney injury
- Seizures
- Stroke
- Death.
**Long-term effects**

There has been limited research into synthetic cannabis dependence. However, anecdotal evidence suggests that long-term, regular use can cause tolerance and dependence.

**WITHDRAWAL**

Giving up synthetic cannabis after using it for a long time is challenging because the body has to get used to functioning without it.

It has been reported that some people who use synthetic cannabis heavily on a regular basis may experience withdrawal symptoms when they try to stop including:

- Insomnia
- Paranoia
- Panic attacks
- Rapid heartbeat.

The risk of tolerance and dependence on synthetic cannabis and their associated effects may be reduced by taking regular breaks from smoking the drug and avoiding using a lot of it at once.

**HEALTH AND SAFETY**

There is no safe way to use synthetic cannabis. If you decide to use the drug, it's important to consider the following:

**Regulating intake**

- It is difficult to predict the strength and effects of synthetic cannabis (even if it has been taken before) as its strength varies from batch to batch.
- Trying a very small dose first (less than the size of a match head) could help gauge the strength and possible effects. Dose size should only be increased slowly – time should be given for the previous dose to wear off.
- Taking synthetic cannabis on its own without a ‘mixer’ such as tobacco or dried parsley should always be avoided. Similarly, inhaling the drug via bongs or pipes can increase the risk of an overdose or bad reaction.

**Misleading packaging**

- The packaging of synthetic cannabis can be misleading. Although contents may be described as ‘herbal’, the actual psychoactive material is synthetic.
- Not all ingredients or their correct amounts might be listed, which can increase the risk of overdose.
- Chemicals usually vary from batch to batch, so different packets can produce different effects, even if the packaging looks the same.

**Mental health risks**

- People with mental health conditions or a family history of these conditions should avoid using synthetic cannabis. The drug can intensify the symptoms of anxiety and paranoia.
- Taking synthetic cannabis in a familiar environment in the company of people who are known and trusted may alleviate any unpleasant emotional effects. Anxiety can be counteracted by taking deep, regular breaths while sitting.
Synthetic cannabis laws in Australia

Synthetic cannabinoid use is illegal throughout Australia. In 2011, the Commonwealth classified eight synthetic cannabis-like substances as prohibited throughout Australia, including them in Schedule 9 (Prohibited Substances) of the Standard for the Uniform Scheduling of Medicines and Poisons.

In 2012, the Therapeutic Goods Administration included a general entry for ‘synthetic cannabinomimetics’ not otherwise specified in Schedule 9 (Prohibited Substances). This entry was intended to limit the ‘new legal mixes’ of synthetic cannabinoids that were not already covered in Schedule 9, and to stop the need for ongoing urgent scheduling as new synthetic cannabis-like substances emerge.

Each state and territory in Australia has also taken action to place bans on the possession and sale of products containing these substances within their own jurisdictions.

WESTERN AUSTRALIA
2011: The Western Australian Government became first state government to ban the possession, sale or intent to supply of seven synthetic cannabinoids by placing them the Poisons Act 1964.

QUEENSLAND

AUSTRALIAN CAPITAL TERRITORY
2012: Following the Therapeutic Goods Administration scheduling of eight synthetic cannabinoids, the ACT adopted the changes under local medicines laws. This action made it illegal to manufacture, obtain, possess, supply, sell and/or use products containing synthetic cannabis in the ACT.

NEW SOUTH WALES
September 2013: Following an earlier temporary ban on synthetics, 45 new psychoactive substances including synthetic cannabinoids, 2C-X and NBOMe were added to the list of prohibited drugs in the Drug Misuse and Trafficking Act. This included threshold quantities for trafficking offences.

SOUTH AUSTRALIA
2011: South Australia banned the possession, sale or intent to supply of seventeen synthetic cannabinoids. The state’s Controlled Substances Advisory Council then evaluated the harmful properties of synthetic cannabinoids, subsequently ruling that the harmful effects were similar to those of cannabis, thereby supporting supported their inclusion in the Controlled Substances (General) Regulations 2000 (using the same threshold quantities as for cannabis).

VICTORIA
2011: After a temporary 12-month ban, the Victorian government permanently added eight synthetic cannabinoids and five synthetic stimulants to the list of prohibited substances, Schedule 11 of the Drugs, Poisons and Controlled Substances Act 1981.

NORTHERN TERRITORY

TASMANIA
2011: The number of banned drugs was extended under the Controlled Drugs, Controlled Precursors and Interpretation under the Schedule of the Misuse of Drugs Act 2001 to include synthetic cannabinoids. The number of controlled precursors under the Act increased from 13 to 53.

Source: Adapted from National Cannabis Prevention and Information Centre, Synthetic cannabinoids: Factsheet 25.
When it absolutely shouldn’t be used

Use of synthetic cannabis is likely to be more dangerous when:
- Taken in combination with alcohol or other drugs, particularly stimulants such as crystal methamphetamine (‘ice’) or ecstasy
- Driving or operating heavy machinery
- Judgement or motor coordination is required
- Alone (in case medical assistance is required)
- The person has a mental health problem
- The person has an existing heart problem

In an emergency

There have been a number of deaths caused by synthetic cannabis. Call triple zero (000) immediately if someone is experiencing negative effects such as:
- Fast/irregular heart rate
- Chest pain
- Breathing difficulties
- Delusional behaviour.

Ambulance officers don’t have to involve the police.

There has been limited research into synthetic cannabis dependence. However, anecdotal evidence suggests that long-term, regular use can cause tolerance and dependence.

CANNABIS USE AND HEALTH

INTRODUCTION

Cannabis is a group of substances from the plant Cannabis sativa. Cannabis is used in three main forms: flowering heads, cannabis resin (hashish) and cannabis oil.

There are more than 60 psychoactive chemicals in cannabis, including the cannabinoids:
- Delta-9 tetrahydrocannabinol (THC), which is found in the resin covering the flowering tops and upper leaves of the female plant and which alters mood and produces the feeling of a ‘high’, and
- Cannabidiol, which can offset the effects of THC.

Cannabis is usually smoked, either in a hand-rolled cigarette (a ‘joint’) containing the leaf, heads or resin of the plant, or through a water-pipe (a ‘bong’) where water is used to cool the smoke before it is inhaled. In Australia, cannabis is also commonly known as gunja, yarndi, weed and dope.

PATTERNS OF CANNABIS USE IN AUSTRALIA AND ITS PUBLIC HEALTH IMPACTS

In 2010, cannabis was the most commonly used illicit drug in Australia. Over one third of Australians (35.4%, approximately 6.5 million) aged 14 years and over had used cannabis at least once in their lifetime, and 1.9 million of these had used cannabis recently (i.e. in the last 12 months). Recent cannabis use among those 14 years and older has increased from 9.1% in 2007 to 10.3% in 2010, though daily users decreased from 14.9% in 2007 to 13% in 2010. In 2010, approximately 247,000 Australians 14 years and over used cannabis daily.

For most cannabis users, use is relatively light. Most young people have used it once or twice. However, the younger people start using cannabis, and the greater the frequency with which they use it, the greater the risk of harm.

Based on current use patterns, alcohol abuse and tobacco pose much greater harms to individual and public health in Australia than cannabis. Cannabis-related psychosis, suicide, road-traffic crashes and dependence were estimated to account for 0.2% of the total disease burden in Australia in 2003. This compares to 7.8% of the total burden attributable to tobacco use and 2.3% attributable to alcohol use. In 2004-05, the estimated social costs of cannabis use (including health, crime, road crash and labour costs) was $3.1 billion. Ninety per cent of this cost was due to dependent cannabis use. In comparison, the health, crime, road-crash and labour costs of alcohol use in 2004-05 are estimated to be more than three times as much ($9.4 billion).

THE HEALTH EFFECTS OF CANNABIS USE

There is a dose-response relationship between cannabis use and its effects, with stronger effects expected from larger doses.

- Intoxicating effects occur within seconds to minutes and can last for three hours
- Effects last longer with larger doses
- Effects on cognitive function and coordination can last up to 24 hours
- Short-term memory impairment may last for several weeks, and
- A single dose in a chronic user can take up to 30 days for the metabolites to be excreted.

Short-term effects of small doses

The most common short-term effects of using cannabis are:
- A feeling of euphoria or ‘high’ – with a tendency to talk and laugh more than usual
- Impaired balance, reaction time, information processing, memory retention and retrieval, and perceptual-motor coordination
- Increased heart rate
- Decreased inhibitions such as being more likely to engage in risky behaviour, e.g. unsafe sexual practice, and
- If smoked, increased respiratory problems including asthma.

Short-term effects of large doses

The most common short-term effects of a large dose can include:
- Hallucinations and changed perceptions of time, sound, colour, distance, touch and other sensations
- Panic reactions
- Vomiting
- Loss of consciousness, and
- Restlessness and confusion.

The severity of these short-term effects depend on a person’s weight, tolerance to the drug, amount taken, interactions with other drugs, circumstances in which the drug is taken, and the mode of administration.

Long-term effects

The evidence associating regular cannabis use with specific long-term health conditions and adverse effects is of variable quality. Cannabis use is highly correlated with use of alcohol, tobacco and other illicit drugs, all of which have potential adverse health effects. There is sufficient evidence, however, to indicate that cannabis is a risk factor for some chronic health effects and conditions.
Regular and prolonged cannabis use may cause:

- Cannabis dependence, characterised by impaired control over its use and difficulties in ceasing use; increased tolerance (meaning more of the drug is needed to produce the same effect) and possible withdrawal symptoms, including anxiety, insomnia, appetite disturbance, and depression.
- Increased risk of myocardial infarction in those who have already had a myocardial infarction.
- Deficits in verbal learning, memory and attention (in heavy users).

While not conclusive, there is evidence that regular cannabis use can cause chronic bronchitis and impaired immunological competence of the respiratory system. Occasional cannabis use, however, is not associated with adverse effects on pulmonary function. Cannabis smoke contains many carcinogens, but there is variable evidence concerning the relationship between cannabis smoking and lung cancer.

Evidence supporting an association between cannabis use and sexual and reproductive effects is weak. However, some studies show an association between cannabis use and increased risk of testicular cancer. There is sufficient evidence of an association between prenatal cannabis use and increased risk of testicular cancer. Daily consumption of large quantities of cannabis may lead to the neglect of other important personal and social priorities such as relationships, parenting, careers and community responsibilities.

**Pregnant women**

Cannabis is the most commonly used illicit drug in women of child-bearing age. Cannabis use during pregnancy has been consistently associated with lower birth-weight babies and pre-term birth, but does not appear to increase the risk of miscarriage or birth abnormalities. Some studies suggest that children exposed to cannabis in utero may have slight impairment in higher cognitive processes such as perceptual organisation and planning. There is insufficient evidence of an association between prenatal cannabis use and postnatal behaviour.

**Accidental ingestion by young children**

Accidental ingestion of cannabis can cause coma in young children. Cannabis ingestion can be confirmed by positive urine screening for cannabinoids. Cannabis ingestion needs to be considered in toddlers and children with impaired consciousness.

**Driving under the influence of cannabis**

Cannabis slows reaction time and increases the risk of having a car crash. Other risk factors are blurred vision, poor judgement and drowsiness which can persist for several hours. The effects are increased by alcohol.

**Dependence and tolerance**

Cannabis dependence is usually defined as impaired control over continued use and difficulty ceasing despite the harms of continued use. Dependence can negatively affect personal relationships, education, employment and many other aspects of a person’s life. Data from Australia and other countries indicates that demand for professional help related to cannabis is increasing. Cannabis dependence is the most frequent type of substance-dependence in Australia after alcohol and tobacco. It has been estimated that cannabis dependence will affect around one in ten cannabis users, and around half of those who use it daily.

Animal and human studies demonstrate that tolerance to many of the psychological and behavioural responses to cannabis occurs with repeated exposure to the drug. The symptoms of withdrawal from cannabis appear similar to those associated with tobacco, but less severe than withdrawal from alcohol or opiates.

There is a view that the cannabis being used today has a higher THC content and potency than in the past. This may be a perception caused by changes in the mode of use (i.e. through ‘bongs’ rather than ‘joints’, and with more consumption of the heads of the cannabis plant). However, there is some independent evidence that cannabis used today can be of a higher potency. The cannabis in recent street-level seizures in Sydney and the North Coast of NSW has been shown to have a high potency, with around 15% THC, with little or no cannabidiol.

**CANNABIS AS A GATEWAY DRUG**

The gateway hypothesis is that cannabis use may act as a causal ‘gateway’ to the use of other illicit drugs such as cocaine and heroin. It is a controversial hypothesis with proponents arguing that because the use of so-called harder drugs is almost always preceded by cannabis use, this means that cannabis use physiologically and/or psychologically causes people to progress to harder drugs. The alternative theory is known as the ‘common cause’ theory whereby a person’s use of cannabis and their later use of other illicit drugs are both seen as effects of common causes such as personal or socio-economic factors, or exposure to illicit drug distribution networks.
Evidence for the gateway hypothesis is inconclusive given the difficulties in disentangling the effect of other potential influences in drug use progression. Meta-analyses suggest that the progression in use that has been observed is likely to be due partially to the influence of independent common causes.  

**CANNABIS AND MENTAL HEALTH**  

**Cannabis and psychosis**

Cannabis use is associated with poor outcomes in existing psychosis and is a risk factor for developing psychosis. For those with existing psychosis, using cannabis can trigger further episodes of psychosis, worsen delusions, mood swings, hallucinations and feelings of paranoia, as well as contributing to poor compliance with medication regimes.

The research base on cannabis and psychosis has expanded in recent years with studies showing a consistent association between early-aged onset of cannabis use, regular use and a later diagnosis of schizophrenia. Meta-analyses have noted a doubling of the risk of psychotic outcomes in regular cannabis users, 25 and earlier onset (by 2.7 years) among cannabis users who develop psychosis. There is increasing evidence that the association between cannabis and onset of psychosis is not due to other co-occurring factors. The most plausible view is that cannabis use is a ‘contributory cause’ of psychosis in vulnerable individuals, and that it is one of a number of potential factors that can bring on psychosis (including genetic predisposition).

**Cannabis and depression**

The association between cannabis use and depression is weak and insufficient to establish a causal connection. Studies that have found an association are likely to have been affected by confounding variables such as family and personality factors, other drug use and marital status. There is currently insufficient evidence available to conclude whether cannabis use is associated with suicide. Research is made difficult by confounding factors such as the stresses of an illicit drug-dependent life and pre-existing poor mental health.

**Cannabis and anxiety**

There is emerging evidence associating cannabis use with anxiety disorders. However, the current level of evidence is not yet sufficient to establish a causal relationship.

**MEDICAL USES OF CANNABIS**

In addition to psychoactive compounds, cannabis has constituents with other pharmacological effects, including antispastic, analgesic, antiemetic, and anti-inflammatory actions. These constituents may have therapeutic potential.

Cannabis extracts and synthetic formulations have been licensed for medicinal use in some countries, including Canada, the USA, Great Britain and Germany, for the treatment of severe spasticity in Multiple sclerosis, nausea and vomiting due to cytotoxics, and loss of appetite and cachexia associated with AIDS. The synthetic cannabis product Nabiximols (Sativex), which is delivered as a buccal spray and so avoids the harms of cannabis smoke inhalation, is effective in the management of spasticity and pain associated with multiple sclerosis. The psychoactive effects of Nabiximols can also be managed through controlling dosage. In Australia, the synthetic cannabinoids nabilone and dronabinol are scheduled by authorities for medicinal use. Sativex is also being trialled in Australia for cancer and cannabis withdrawal. Canada has allowed the medical use of smoked cannabis if this is authorised and monitored by a doctor.

There is a growing body of evidence that certain cannabinoids are effective in the treatment of chronic pain, particularly as an alternative or adjunct to the use of opiates, when the development of opiate tolerance and withdrawal can be avoided. Controlled trials have also shown positive effects of cannabis preparations on bladder dysfunction in Multiple sclerosis, tics in Tourette syndrome, and involuntary movements associated with Parkinson's disease. Based on existing data, the adverse events associated with the short-term medicinal use of cannabis are minor. However, the risks associated with long-term medicinal use are less well understood, particularly the risk of dependence, and any heightened risk of cardiovascular disease.

Though there is a growing body of evidence regarding the therapeutic use of cannabinoids, it is still experimental.

**SYNTHETIC CANNABIS**

Synthetic cannabis products have been developed, usually in herbal form for smoking. These products have been marketed in Australia as ‘legal highs’ with product names such as ‘Spice’, ‘K2’, and ‘Kronic’. The psychoactive components are usually THC analogues.
that bind to cannabinoid receptors in the brain. These analogues are not easily detectable by routine testing, and until recently have not been captured by legislation. These synthetic cannabis products are attractive to their users because they are perceived as safe, are not easily detectable in drug tests, and until recently have not been illegal.\textsuperscript{39}

The synthetic cannabis products can not be considered safe given that the synthesised psychoactive substances in them have not been rigorously tested, and little is known about their long or short-term health effects, dependence potential or adverse reactions.\textsuperscript{40} Psychotic symptoms have been associated with use of some synthetic cannabinoids, as well as signs of addiction and withdrawal symptoms similar to those of cannabis.\textsuperscript{41} Adverse outcomes have been reported from the use of Kronic in Australia.

**THE CONTROL OF CANNABIS USE AND SUPPLY**

**Australian legislation**

The possession, cultivation, use, and supply of cannabis is prohibited in all Australian states and territories. In some Australian jurisdictions there are criminal penalties for the possession, cultivation and use of cannabis, and in others there are less severe civil penalties. Legislation in Australia often distinguishes between possession of small amounts of cannabis (for personal use), possession of larger amounts (trafficable quantities), and possession of even larger "commercially trafficable" quantities. The supplying of cannabis and the possession of large quantities attract criminal penalties in all Australian jurisdictions.\textsuperscript{42} All Australian states and territories have diversionary schemes for minor and early cannabis offenders which require them to undertake educative and treatment programs as an alternative to receiving a criminal penalty.\textsuperscript{43}

**Criminalisation and health**

It is often thought that criminal penalties are a deterrent to cannabis use and, therefore, an effective way to prevent the health impacts and other harms associated with cannabis use. These beliefs have little foundation. A system of criminal prohibition for cannabis use applied in Australia for many years, but the incidence of cannabis use was still significant. The introduction of less serious civil penalties and diversionary alternatives to criminal sanctions did not significantly increase the rates of uptake and use among Australians.\textsuperscript{44}

For those who are not deterred from use by criminal penalties, criminalisation can add to the potential health and other risks to which cannabis users are exposed.

These include:\textsuperscript{45}

- Exposure of cannabis users, including teenage and occasional users, to ‘harder drugs’. Those who acquire cannabis from large scale illicit drug distribution networks will also become exposed to more harmful drugs, including the direct marketing of those drugs to them
- Exposure of cannabis users to criminal networks and activity, including exposure to the threat of violence and the risk of taking part in criminal distribution
- The personal and health-related costs of a criminal conviction. A criminal conviction can negatively impact on a person’s employment prospects and their accommodation and travel opportunities. Limited employment and accommodation prospects can lead to poor health, including mental health. Individuals with a criminal record are also at a disadvantage in any subsequent criminal proceedings
- A deterrent to individuals seeking health advice, treatment and support regarding their cannabis use
- The inability to collect high quality, reliable data regarding patterns of use and harms.\textsuperscript{46}

**Harm reduction**

A harm-reduction approach is defined as policies and initiatives that aim to reduce the adverse health, social and economic consequences of substance use to individual drug users, their families and the community. Harm reduction considers both the potential harms to individuals using substances like cannabis and the potential harms and negative impacts of the different approaches for controlling the use and supply of these substances.

When harm reduction is the primary goal, the key policy focus will be on measures to reduce individuals’ harmful levels of cannabis use, or cannabis use among individuals who are most vulnerable to adverse health impacts, or cannabis use in contexts which involve serious risks to users. Harm-reduction measures include targeted efforts to reduce the supply of cannabis and to reduce demand for it among vulnerable groups. In certain contexts, and with certain groups, measures emphasising abstinence may also contribute, in a preventive way, to reducing harms.

Policy and legislative approaches that do not effectively address cannabis-related harms or create significant risks and adverse impacts are not consistent with harm-reduction. Prohibition of cannabis use with criminal penalties has the potential to produce harms and risks. The effectiveness of criminal prohibition of cannabis use in reducing the health-related harms associated with cannabis use is questionable.

**TREATMENT OPTIONS**

The number of people seeking treatment for cannabis use is increasing, but most of those who experience cannabis dependence do not seek help.\textsuperscript{47} Many regular cannabis users do not believe they need treatment, and there is also a low awareness of the treatment options available and how to access them.

There are fewer treatment options for cannabis dependence than for alcohol or opiate dependence,
and limited research on the effectiveness of different cannabis treatment options. Treatments for problematic cannabis use include psychological interventions such as cognitive behavioural therapy and motivational enhancement, and pharmacological interventions with medications to ease the symptoms of withdrawal or block the effects of cannabis. The research on pharmacological interventions for cannabis is in its infancy, with medications still in the experimental stages of development.

Cognitive behavioural therapy helps the cannabis user develop knowledge and skills to identify risk situations when using cannabis and to modify behaviour accordingly. Motivational enhancement techniques build the cannabis user’s desire to address their problematic use. These counselling interventions are increasingly available online as web-based programs, as well as face-to-face with a counsellor. Online programs have the advantage of convenience and anonymity, for those who are concerned about possible stigma. Difficulties in maintaining motivation, and limitations in personalising the programs to individual needs, are drawbacks. According to current research, web-based treatment programs may not be as effective as in-person treatment.

Some problematic cannabis users have particular treatment needs, including those with cannabis dependence and mental health issues. These individuals require integrated treatment and coordinated care. General practitioners can play an important role in developing a coordinated care plan to suit the needs of these patients.

**THE AUSTRALIAN MEDICAL ASSOCIATION POSITION**

The AMA acknowledges that cannabis use is harmful and can lead to adverse chronic health outcomes, including dependence, withdrawal symptoms, early onset psychosis and the exacerbation of pre-existing psychotic symptoms. While the absolute risk of these outcomes is low and those who use cannabis occasionally are unlikely to be affected, those who use cannabis frequently and for sustained periods, or who initiate cannabis use at an early age, or who are susceptible to psychosis, are most at risk.

The AMA also recognises that cannabis use has short-term effects on cognitive and perceptual functioning which can present risks to the safety of users and others. The AMA believes that cannabis use should be seen primarily as a health issue and not primarily as a matter for law enforcement. The most appropriate response to cannabis use should give priority to policies, programs and regulatory approaches that reduce the harms potentially associated with cannabis use, and particularly the health-related harms. The positions outlined below should be read in the light of this harm-reduction principle.

The AMA believes the following are the important considerations and central elements in an appropriate harm-reduction response to cannabis use.

**Prevention and early intervention**

- As younger people and those who use cannabis frequently are most at risk of harm, prevention and early intervention initiatives to avoid, delay and reduce the frequency of cannabis use in these populations are essential.
- All children should have access to developmentally appropriate school-based life-skills programs to assist in preventing or reducing potential substance use problems.
- Evidence-based information on the potential risks of cannabis use and where to seek further assistance should be widely available, particularly to young people.
- Medical professionals can play an important role in the early identification of patients they believe to be at risk of adverse health outcomes from cannabis use.
- When a cannabis user comes into contact with law enforcement or justice administration agencies this should be used as an opportunity to direct them to education, counselling or treatment. This is particularly important with young and first time or early offenders.

**Diagnosis and treatment**

- Medical professionals have the knowledge and opportunity to screen for and diagnose cannabis-related disorders, including dependence, withdrawal symptoms, and cannabis-induced psychosis. Referral networks and linkages should be established within regions between primary care and specialist mental health and drug and alcohol services, to ensure integrated and coordinated treatment support for cannabis use problems.
- Medical professionals, particularly general practitioners, have the opportunity to counsel patients who are at risk of cannabis-related harms, and they should be supported to provide education and advice about those potential harms.
- Targeted treatment regimens should be developed and resourced for groups with particular needs, including those with dual diagnoses, multiple drug use, young teenage users and culturally appropriate services for Aboriginal peoples and Torres Strait Islanders. Of particular importance are suitable treatment services for cannabis users with mental health needs.
- Every effort should be made to address the personal and systemic barriers that cannabis users face in seeking treatment and support when they need it. These include barriers associated with perceptions of stigmatisation, users’ and professionals’ awareness of treatment options, and users’ beliefs that they do not have a health problem.
• Doctors should consider accidental cannabis ingestion in the differential diagnosis of children with impaired consciousness.
• Cannabis users should have access to the rehabilitative services and support they require to manage associated disorders and particularly the risk of relapse.

**Medical uses of cannabis**
The Australian Medical Association acknowledges that cannabis has constituents that have potential therapeutic uses.
• Appropriate clinical trials of potentially therapeutic cannabinoid formulations should be conducted to determine their safety and efficacy compared to existing medicines, and whether their long-term use for medical purposes has adverse effects.
• Therapeutic cannabinoids that are deemed safe and effective should be made available to patients for whom existing medications are not as effective.
• Smoking or ingesting a crude plant product is a risky way to deliver cannabinoids for medical purposes. Other appropriate ways of delivering cannabinoids for medical purposes should be developed.
• Any promotion of the medical use of cannabinoids will require extensive education of the public and the profession on the risks of the non-medical use of cannabis.

**Law enforcement, cannabis regulation and health**
• In assessing different legislative and policy approaches to the regulation of cannabis use and supply, primary consideration should be given to the impact of such approaches on the health and wellbeing of cannabis users.
• The AMA does not condone the trafficking or recreational use of cannabis. The AMA believes that there should be vigorous law enforcement and strong criminal penalties for the trafficking of cannabis. The personal recreational use of cannabis should also be prohibited. However, criminal penalties for personal cannabis use can add to the potential health and other risks to which cannabis users are exposed. The AMA believes that it is consistent with a principle of harm reduction for the possession of cannabis for personal use to attract civil penalties such as court orders requiring counselling and education (particularly for young and first time offenders), or attendance at ‘drug courts’ which divert users from the criminal justice system into treatment.
• When cannabis users come into contact with the police or courts, the opportunity should be taken to divert those users to preventive, educational and therapeutic options that they would not otherwise access.
• In allocating resources, priority should be given to policies, programs and initiatives that reduce the health-related risks of cannabis use. Law enforcement should be directed primarily at cannabis supply networks.
• The AMA believes that the availability and use of synthetic cannabis products (including herbal forms) poses significant health risks, given that the psychoactive chemical constituents of these products are unknown and unpredictable in their effect. There are particular challenges in regulating these products, and Australian governments must make a concerted effort to develop consistent and effective legislation which captures current and emerging forms of synthetic cannabis.

**Research**
• Further research is needed into the relationship between cannabis use and psychosis and other mental health problems, including the identification of those at greatest risk of cannabis-induced psychosis.
• There should be continuing research to identify the risk factors that contribute to individuals developing problematic or early onset cannabis use, and the factors and interventions that can protect against these.
• Australian governments should fund research into best practice treatment methods, including suitable pharma-2934218470665431840. To get a fresh perspective on the situation, a new study was conducted, revealing promising results.

**Issues in Society | Volume 401**

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cannabis-dependent or who wish to reduce or cease their use.

• There should be systematic ongoing monitoring of the different legislative and policy approaches on cannabis operating in overseas jurisdictions to assess their health and harm-related impacts. The evidence obtained should inform critical reviews of the approaches that operate in Australia.

ENDNOTES

51. There are also brief interventions online (for example, at https://ncpic.org.au/ncpic/helpline/).
CANNABIS AND PSYCHOTIC ILLNESS

SANE Australia explains the effects of cannabis on mental health in this fact sheet

What is cannabis?
Cannabis refers to the products of the Cannabis sativa plant, also known as marijuana and hashish (depending on which part of the plant is used). Cannabis is widely available for use as a recreational drug. It is commonly taken by mixing with tobacco and smoking as a hand-rolled joint, or by inhaling through a water-cooled pipe called a bong. It may also be cooked in food and eaten.

How many people use cannabis?
Cannabis is the most widely used illicit drug in Australia. Around 30% of the population have tried cannabis at some time. Among people under 35 years of age, around 50% had tried it at some time, and 28% had used it in the last year.

How does cannabis affect the brain?
Cannabis contains a chemical known as tetrahydrocannabinol (THC). THC is a psychoactive substance. This means it travels through the bloodstream to the brain, disrupting its usual functioning and causing intoxicating effects. Some of these effects can be pleasant at the time; some are unpleasant. Most of these effects are short-term; some can be long-term.

What are the effects of cannabis?
Common effects include a feeling of relaxation; loss of inhibition; increased talkativeness; confused perception of space and time; sedation, and reduced ability to concentrate and remember. Other effects may include paranoia, confusion and increased anxiety. With heavy use there may also be hallucinations.

How long do the effects last?
The effects begin within minutes and can last up to several hours. For people with a psychotic illness, or who have a predisposition to such an illness, the effects can be more serious and long-term. Psychotic illnesses are characterised by symptoms such as delusions, hallucinations and thought disorder. When people experience psychotic symptoms, they are unable to distinguish what is real – there is a loss of contact with reality.

Does cannabis cause psychotic illnesses like schizophrenia?
Use of cannabis can cause a condition called drug-induced psychosis. This usually passes after a few days. However, if someone has a predisposition to a psychotic illness such as schizophrenia, cannabis may trigger the first episode of an ongoing condition such as schizophrenia. There is increasing evidence that regular cannabis use precedes and even causes higher rates of psychotic illness. At the same time, many people with schizophrenia have not used cannabis.

How does cannabis affect someone with a psychotic illness?
Cannabis generally makes psychotic symptoms worse and lowers the chances of recovery from a psychotic episode. People with a psychotic illness, such as schizophrenia, who use it experience more hallucinations, delusions and other symptoms; they have a higher rate of hospitalisation for psychosis, and treatment is generally less effective and recovery more difficult.

So should someone with a psychotic illness avoid drugs like cannabis?
Yes. The consequences can be so serious for the
People with a psychotic illness, such as schizophrenia, who use it experience more hallucinations, delusions and other symptoms; they have a higher rate of hospitalisation for psychosis, and treatment is generally less effective and recovery more difficult.

How do I find out more?

It is important to ask your doctor about any concerns you have. SANE Australia also produces a range of easy-to-read publications and multimedia resources on mental illness.

For more information about this topic see:

- **SANE Guide to Drugs**
  Explains the relationship between drugs and mental illness and looks at identifying when drug use becomes a problem as well as providing information on how to support someone change their drug use.

- **SANE Guide to Healthy Living**
  Explains the benefits of being physically healthy, gives tips on how to start becoming healthier and overcome obstacles as well as giving suggestions on finding support to help stay healthy.

- **SANE Guide to Schizophrenia and other Psychotic Illness**
  Helps people who have schizophrenia or have had a psychotic episode and their family and friends understand what it means to have this diagnosis, how it is treated and what family and friends can do to help.

- **SANE Guide to Medication and other Treatments**
  Explains how all the different aspects of treatment work, by looking at clinical care, medication, support in the community and helping yourself.

- **SANE Guide to a Smokefree Life**
  Provides practical tips on how to quit smoking, specially written for people with a mental illness.

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People’s health that it is best to avoid drugs such as cannabis completely. People at higher risk of developing a psychotic illness – if they have other family members with the illness, for example – should also avoid using cannabis. It can be helpful to look at other, healthier ways of relaxing and socialising as an alternative.
REMIND ME AGAIN, HOW DOES CANNABIS AFFECT THE BRAIN?

Heavy cannabis use is consistently associated with poorer attention and memory, and increased rates of mental health problems, write Murat Yücel, Aaron Kandola and Adrian Carter in this article first published in The Conversation.

Governments and communities worldwide are softening their views on cannabis use. Trials of medicinal cannabis have been approved in Victoria, Queensland and New South Wales. And the Australian parliament is currently debating legislation to introduce a government regulator of medicinal cannabis.

This follows decriminalisation of cannabis in Portugal and its legalisation in Uruguay and several US states.

Cannabis is still the product of choice for many illicit drug users in Australia. Five times as many people use cannabis rather than cocaine or methamphetamines.

But debate remains about the long-term effect the drug has on the brain, cognition and mental health. Most cannabis users start as teenagers and there is a widespread perception that this can disrupt critical developmental processes to leave a lasting negative impact on the brain.

Let’s look at what the latest research has to say about the long-term harms, whether they can be reversed, and the possibility of making the drug safer.

HOW DOES IT AFFECT THE DEVELOPING BRAIN?

Studies have shown that individuals who begin regular and heavy cannabis use in their teenage years have a lower level of educational attainment and IQ, earn a lower wage, and are more likely to engage in heavy alcohol or hard drug use, suffer from mental health problems, or end up in prison.

Heavy cannabis use – defined as daily use for at least one year – is consistently associated with poorer attention and memory, as well as earlier and increased rates of mental health problems, especially psychotic symptoms.

Researchers have also identified differences in the brain associated with these cognitive and mental health impairments.

However, there are a range of factors that can influence cognition, mental health and brain structure. These include age, use of other substances, rate of exercise, education level, family history, childhood abuse and neglect, pre-existing neurological differences, and the chemical composition of the cannabis itself.

It’s often not possible to account for all these factors when undertaking cannabis research. So it’s difficult to tell how much of the difference in a participants’ performance on a cognitive task, mental health and brain structure is attributable to their level of cannabis use and how much can be explained by other factors.

Debate remains about the long-term effect the drug has on the brain, cognition and mental health. Most cannabis users start as teenagers and there is a widespread perception that this can disrupt critical developmental processes to leave a lasting negative impact on the brain.
Surprisingly, no studies to date have investigated whether the persistent effects of heavy cannabis use on brain structure can also recover with abstinence.

**ARE THE IMPAIRMENTS REVERSIBLE?**

We are only just beginning to understand how well-equipped the human brain is for adapting to environmental demands or stresses. This capacity, known as brain plasticity, means that our brain is constantly striving to optimise its functioning, even when it is damaged or injured.

A stroke, for instance, can harm certain areas of the brain but it is possible that at least some functioning of that region may be restored as neural connections are rewired in an attempt to compensate for the damage.

Similar recovery mechanisms may operate in cases where the brain has been harmed from long-term and heavy cannabis exposure. Though just a handful of researchers have investigated this possibility in the context of cognition.

One large-scale study conducted over eight years found that heavy cannabis use was associated with memory impairments, but individuals had shown improvements in their memory once they stopped using the drug.

Other studies have shown that as little as three to six weeks of abstinence was sufficient for memory improvements.

Yet another study found no cognitive deficits in former users after only three months of abstinence.

Heavy cannabis use has also been suggested to disrupt neural functioning associated with memory. But again, a six-week period of abstinence was sufficient to show some recovery at the neural level.

However, a large study that followed cannabis users over nearly four decades found that there are limits to the ability of the brain to recover in those who begin using during early adolescence. Although cognition was improved in long-term cannabis users after 12 months of abstinence, cognitive impairments did persist, particularly in those who began using cannabis early.

Surprisingly, no studies to date have investigated whether the persistent effects of heavy cannabis use on brain structure can also recover with abstinence.

Stimulating brain plasticity is a major interest to neuroscientists. Some of the interventions to induce plasticity may facilitate the recovery from heavy cannabis use. Exercise is well established in promoting brain health, including the growth and development of neurons. It is possible that reversing cannabis-related harm through abstinence could be augmented with interventions such as exercise.

But while there is some evidence for recovery of function, it’s an area that remains inconsistent and under-studied. More research is required before such an idea could bare any practical significance.

**WHAT’S IN YOUR CANNABIS?**

Cannabis contains a wide variety of psychoactive substances. The most prominent are the cannabinoids D9-tetrahydrocannabinol (THC) and cannabidiol (CBD).

Police seizures indicate there has been a sharp rise in the level of THC relative to CBD in smoked cannabis in recent decades. This could be due to a number of factors such as changes in the way people are growing the plant, using the different parts of the plant, or how they are preparing it for use.

THC is responsible for the ‘high’ associated with cannabis, but also causes psychotic symptoms and cognitive impairments. CBD is believed to limit the adverse impact of THC on the brain. But we don’t know what proportion of CBD is necessary to mitigate these adverse effects. Nor do we know the extent to which these effects can be mitigated by CBD alone.

The creation of a well-regulated cannabis market, as has occurred in Colorado, may give researchers access to reliable information about the chemical composition of the cannabis that an individual is consuming. This will make it possible to directly investigate whether CBD has a role to play in limiting the damage or even aiding recovery from the cannabis-related harm to the brain from heavy use.

Establishing the long-term impact of cannabis on the brain is a research priority for neuroscientists. Answers are needed to largely untouched questions such as whether any potential harm could be reversed (through exercise or other interventions) and whether increasing the concentration of CBD can limit the negative impact caused by cannabis high in THC.

The legislative changes poised to increase the availability of cannabis are outpacing our understanding of the impact that the drug has on the brain. Without addressing these shortfalls in our knowledge, a fully informed debate about the likely consequences of increased cannabis use, whether it be for medical or recreational use, will not be possible.

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**THE CONVERSATION**

Cannabis is the most commonly used illicit drug in Australia, with one in three adults using it at some point in their lives. It’s legal in some places around the world, and offered medicinally in others. But what does smoking pot do to your mental health?

The potential harms associated with using cannabis depend on two things above all others. The first is the age at which you first begin to use cannabis, particularly if it’s before 18. Using cannabis during key stages of brain development can impact on synaptic pruning (when old neural connections are deleted) and the development of white matter (which transmits signals in the brain).

The second is the patterns of use: the frequency, dose and duration, particularly if you’re using at least weekly. The bigger or more potent the dose, the more tetrahydrocannabinol (THC) you are ingesting. THC is the main psychoactive component of cannabis and appears to act on areas of our brain involved in the regulation of our emotional experiences.

Depression and anxiety

Many studies of the relationship between cannabis use and mental illnesses such as depression and anxiety have suffered from methodological issues by not controlling for related factors.

The few longitudinal studies that have been conducted have mixed findings. A 2014 review of the existing research concluded that using cannabis placed an individual at moderate risk of developing depression.

Unfortunately it was not within the scope of the research to determine if cannabis use was causing depression or if the relationship instead reflects the association between cannabis use and social problems. Cannabis use is associated with other factors that increase risk of depression such as school dropout and unemployment.

The relationship between cannabis use and anxiety is also complex. Many people use cannabis for its euphoric and relaxing effects. But some people also experience feelings of anxiety or paranoia when intoxicated. As such, cannabis could be used to relieve anxiety or stress for some while causing others to feel anxious.

A 2014 review of the available research concluded that using cannabis placed an individual at a small risk of developing anxiety. But the authors noted that while the weight of evidence supported the coexistence of cannabis use and anxiety, there was relatively little evidence to suggest that cannabis caused anxiety.

Not included in these previous reviews of depression and anxiety disorders were two recent investigations of cannabis use in the United States using data from 2001-2002 and 2004-2005. These included a host of variables such as demographic status and family environment.

Each found a significant association between cannabis use and the onset of depression and anxiety disorders. But this association was no longer significant when considering the impact of the included variables.

Clearly, the relationship between cannabis use and depression and anxiety disorders is complex and involves the individual’s reasons for cannabis use and external situations. That is, cannabis may be used to help cope with social problems that were not necessarily caused by cannabis use.

Schizophrenia

In contrast, the relationship between cannabis use and risk of developing symptoms of psychosis has been well established in many different review articles.

The potential harms associated with using cannabis depend on two things above all others. The first is the age at which you first begin to use cannabis, particularly if it’s before 18 ... the second is the patterns of use: the frequency, dose and duration, particularly if you’re using at least weekly.
This research has found that early and frequent cannabis use is a component cause of psychosis, which interacts with other risk factors such as family history of psychosis, history of childhood abuse and expression of the COMT and AKT1 genes. These interactions make it difficult to determine the exact role of cannabis use in causing psychosis that may not have otherwise occurred.

Regardless, the connection between cannabis use and psychosis is not surprising. There is a strong resemblance between the acute and transient effects of cannabis use and symptoms of psychosis, including impaired memory, cognition and processing of external stimuli. This combines to make it hard for a person to learn and remember new things but can also extend to the experience of deluded thinking and hallucinations.

We also know that cannabis use by people with established psychotic disorder can exacerbate symptoms.

Overall, the evidence suggests cannabis use will bring forward diagnosis of psychosis by an average of 2.7 years. The risk of developing schizophrenia increases with the duration and dose of cannabis use. Regular cannabis users have double the risk of non-users. Those who have used cannabis at some point in their life have a 40% increased risk compared with non-users.

That said, it is important to view this increased risk in context. The proportions of individuals with psychosis among the population and among cannabis users are low. Current estimates suggest that if frequent long-term cannabis use was known to cause psychosis, the rates of incidence would increase from seven in 1,000 in non-users to 14 in 1,000 cannabis users.

If you or a family member or friend have problems or concerns about cannabis, visit www.ncpic.org.au or access the free national Cannabis Information and Helpline on 1800 30 40 50.

Peter Gates is Senior Research Officer, National Drug and Alcohol Research Centre, UNSW Australia.

Is marijuana less dangerous than alcohol?

A FACT CHECK REPRODUCED COURTESY OF ABC NEWS

Legalisation of marijuana is back in the news. In the United States, Colorado and Washington have legalised the sale of marijuana for recreational use. In Australia, some have called for the legalisation of marijuana as a solution to alcohol-fuelled violence in popular nightspots.

US president Barack Obama weighed into the debate in a recent magazine interview. The president told the reporter: “As has been well documented, I smoked pot as a kid, and I view it as a bad habit and a vice, not very different from the cigarettes that I smoked as a young person up through a big chunk of my adult life. I don’t think it is more dangerous than alcohol,” he said.

When asked whether it was less dangerous, Mr Obama said that it was less dangerous in terms of its impact on the individual consumer. “It’s not something I encourage, and I’ve told my daughters I think it’s a bad idea, a waste of time, not very healthy,” he said.

ABC Fact Check looks at whether Mr Obama’s comparison of the health effects of marijuana and alcohol is supported by the evidence. In light of Mr Obama’s second answer, the analysis is confined to the direct health impact of these substances on the user.

How are alcohol and marijuana used?
The health risks associated with both substances increase with quantity and frequency of use and, in relation to marijuana, the age of first use.

The Australian Institute of Health and Welfare conducts a survey of alcohol and drug use by Australians and then makes an estimate of use by the wider population. Its most recent report estimates that in 2010, of the population aged 14 years or over, 80.5 per cent had used alcohol and 10.3 per cent had used cannabis in the last 12 months.

The figures for the consumption of alcohol are broken down into ‘drinking status’. The institute estimates that of all people aged 14 years and older:

• 7.2 per cent drank alcohol daily
• 39.5 per cent drank weekly
• 33.8 per cent less than weekly
• 7.4 per cent were ex-drinkers
• 12.1 per cent had never had a full glass of alcohol.

The incidence of daily drinking increases with age, with the highest portion being among people aged 70 and above (14.8 per cent) and the lowest being 2.1 per cent of people aged 20 to 29. Reliable figures are not available for the age range 12 to 19.

The survey found that of people aged 12 years and older who had used cannabis in the last 12 months:

• 13.0 per cent used every day

The Australian Institute of Health and Welfare estimates that of all people aged 14 years or above (14.8 per cent) and the lowest being 2.1 per cent of people aged 20 to 29. Reliable figures are not available for the age range 12 to 19.

The survey found that of people aged 12 years and older who had used cannabis in the last 12 months:

• 13.0 per cent used every day

THE CLAIM: Barack Obama says smoking marijuana is less dangerous than drinking alcohol.

THE VERDICT: There is not enough evidence to substantiate Mr Obama’s claim.

• 20.9 per cent once a week or more
• 13.5 per cent about once a month
• 17.9 per cent every few months
• 34.6 per cent once or twice a year.

Professor Wayne Hall of the University of Queensland tells Fact Check that “given the illegality of cannabis and the lack of standard doses or methods of use, it is difficult to quantify how much cannabis users typically use.” He estimates about one in 10 people who use cannabis will be heavy users – that is, using daily or almost daily.

Health impact of alcohol

Many alcohol users will have at one point in their lives experienced some of the short term effects of too much alcohol such as headaches, lack of coordination, shakiness, nausea, vomiting and passing out.

More serious impacts of long term and excessive alcohol consumption include brain damage, heart and liver disease, pancreatitis, mouth, neck and throat cancers and a compromised immune system. Long term alcohol use can lead to dependence, with severe withdrawal symptoms.

Guidelines released by the Australian National Health and Medical Research Council say there is “no level of drinking alcohol that can be guaranteed to be completely safe or no risk”, but its advice is that the health risks can be reduced if people “drink no more than two drinks per day”.

The US National Institute on Alcohol Abuse and Alcoholism allows for slightly higher consumption. It says that “low-risk” drinking levels for men are no more than four drinks on any single day and no more than 14 drinks per week. For women, “low-risk” drinking levels are no more than three drinks on any single day and no more than seven drinks per week.

Health impact of marijuana

Like alcohol, marijuana is not a harmless drug. The Australian Drug Foundation notes that in addition to the desired effects on users, “low to moderate doses of cannabis” can also lead to increased heart rate, low blood pressure and anxiety. Over the long term, cannabis can have a negative impact on brain and lung function, hormone levels, the immune system and mental health.

“Cannabis use is associated with psychotic symptoms, schizophrenia, anxiety and depression,” according to a discussion paper released by the United Nations
Fact Check: "It doesn’t make much sense to compare the two because they are very different drugs that are used in lots of different contexts."

In relation to cannabis, Professor Hall tells Fact Check that “the evidence for harm arising from cannabis use is clearest for those who engage in daily or near daily use”. However, it is harder to make a call when looking at more irregular use. “We still argue about the risks and alleged benefits of using small quantities of alcohol where we have extensive epidemiological data,” he said. “We have less capacity to give evidence-informed advice on the risks of less than daily cannabis use.”

Professor Room says that “at the lower end it would be hard to say which was riskier”. However, he tells Fact Check that at “higher levels both in the moment and cumulatively over time, clearly alcohol is riskier”.

The verdict
There is not enough evidence to assess whether marijuana is less dangerous than alcohol for users. Mr Obama’s comparison between the health effects of alcohol and marijuana is unsubstantiated.

SOURCES
• NSW Health, Fact Sheet: Alcohol.
• National Institute on Alcohol Abuse and Alcoholism, Beyond Hangovers: understanding alcohol’s impact on your health.
• Australian National Health and Medical Research Council, Australian Guidelines to reduce health risks from drinking alcohol, 2009.
• Australian Drug Foundation, Fact Sheet: Cannabis.
• United Nations Office on Drugs and Crime, Cannabis: A short review.

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Historically, cannabis was not seen as a drug of dependence like heroin or alcohol, but cannabis dependence is now well recognised in the scientific community, according to this fact sheet information from the National Cannabis Prevention and Information Centre.

Typically, people who use cannabis do not progress to using the drug regularly, or for long periods of time. Most will experiment every now and then with cannabis during adolescence and early adulthood and stop using once they are in their mid to late 20s.

However, some people will use cannabis for longer and more often, and become dependent on the drug. Historically, cannabis was not seen as a drug of dependence like heroin or alcohol, but cannabis dependence is now well recognised in the scientific community.

**What is cannabis dependence?**

Dependence on cannabis means that the person needs to use cannabis just to feel ‘normal’.

In order to be diagnosed as cannabis dependent, a person needs to experience at least three of the following in the one year:

- Tolerance to the effects of cannabis, meaning that more cannabis is needed to get the same effect
- Withdrawal symptoms from cannabis, such as irritability, trouble sleeping and depressive symptoms
- Using more cannabis than was intended
- Persistent desire to stop using cannabis or to cut down and being unsuccessful at this
- Spending a lot of time obtaining, using or recovering from the use of cannabis
- Giving up important activities in favour of using cannabis, and/or
- Using cannabis even when it is known that it causes problems.

It has been estimated that there are at least 200,000 people dependent on cannabis in Australia. About one in ten people who have tried cannabis at least once in their lifetime will become dependent on it.

**What are the consequences of being dependent on cannabis?**

People who are dependent on cannabis are at a higher risk of suffering from the negative consequences of using the drug, such as short-term memory impairment, mental health problems and respiratory diseases (if cannabis is smoked).

Regular use and dependence can also lead to problems with finances, conflict in relationships with family and friends, and employment problems.

**How many people become dependent on cannabis?**

It has been estimated that there are at least 200,000 people dependent on cannabis in Australia. About one in ten people who have tried cannabis at least once in their lifetime will become dependent on it.

The more often a person uses cannabis, the more likely they are to become dependent on it. If someone uses cannabis everyday, they have a 50/50 chance of becoming dependent on it. Young people develop cannabis dependence more quickly than adults.

**Who are most at risk of being dependent on cannabis?**

The earlier a person starts using cannabis, and the more they use, the more likely they are to become dependent.

Studies have shown that males are more likely than females to become dependent on cannabis.
What are the symptoms of cannabis dependence?

One of the most common symptoms of cannabis dependence is the experience of discomfort when ceasing use. This is known as withdrawal.

Studies with cannabis users who have recently quit, report that withdrawal symptoms start on the first day, usually peak in the first two to three days, and with the exception of sleep disturbances, are usually very mild by the end of the first week of abstinence. Withdrawal symptoms are usually over after two weeks.

The more often a person uses cannabis, the more likely they are to become dependent on it. If someone uses cannabis everyday, they have a 50/50 chance of becoming dependent on it. Young people develop cannabis dependence more quickly than adults.

The most common symptoms include:
- Anxiety/nervousness
- Restlessness/physical tension
- Reduced appetite
- Mood swings/irritability/restlessness
- Cravings to smoke cannabis
- Sleep difficulties including insomnia and strange dreams.

Even though these symptoms are not life threatening, they can be distressing enough for the person trying to stop using cannabis, to start again.

Is there any treatment for cannabis dependence?

There are a number of treatment options available for cannabis-dependent people to cut down or quit. Studies have shown that even a single session with a counsellor can assist the cannabis-dependent person to bring about significant improvements in their level of use and wellbeing.

The intensity of treatment depends on individual circumstances; some people respond to general education and information about managing cravings and high risk situations for relapse, others may even need inpatient management for cannabis withdrawal and rehabilitation.

As yet, there are no effective pharmacological treatments to help reduce cannabis withdrawal symptoms or to block the effects of cannabis, although studies are underway.

For further information please see the fact sheets Cannabis and withdrawal and Treatment for cannabis use problems on the website, www.ncpic.org.au

The use of cannabis for medical purposes

This paper prepared by Jan Copeland and Nicole Clement on behalf of the National Cannabis and Information Centre focuses on the evidence regarding the efficacy of cannabinoids and crude plant in the management and treatment of medical conditions.

It is rare to have heated public debate on the use of a drug as medicine. While the evidence-base on the indications, dosage and length of treatment for medicinal herbal cannabis (rather than synthetic or pharmaceutical preparations) has developed little in the past decade, its availability has greatly expanded, particularly in North America.

As a result of the degree of public interest in the matter, the Centre made a submission to the recent NSW Parliament Legislative Council’s Inquiry Into The Use Of Cannabis For Medical Purposes summarising the scientific literature. This Bulletin is based on that submission. There are a range of position papers available that discuss the relevant national and international agreements that touch on the availability of cannabis products for medicinal use and the complexities of designing a robust system of supply.

This paper, therefore, focuses on the evidence regarding the efficacy of cannabinoids and crude plant in the management and treatment of medical conditions.

Introduction

Prior to the development of modern science, cannabis was used as a medicine. It enjoyed a brief period of popularity as a medicinal herb in Europe and the United States in the 1800s being prescribed for various conditions including menstrual cramps, asthma, cough, insomnia, birth labour, migraine, throat infection and withdrawal from opiate use. Because of the problems with titrating the dose there were issues with patients being given too little or too much resulting in anything from no effect to adverse effects.

Cannabis was removed from the register of medicines in the early twentieth century in the USA and made illegal at around the same time.

In the past 20 years there has been increasing international focus on the potential of cannabis as a treatment option for various medical conditions, mainly where traditional first line drugs have proven ineffective for particular subclasses of patients. The most common conditions include pain and nausea associated with cancer and its treatment, HIV and other wasting diseases, rheumatoid arthritis and peripheral neuropathic pain. It has also been used to treat the nightmares associated with post-traumatic stress disorder. Accordingly, during this time pre-clinical and clinical research on humans into the effects of pharmaceutical preparations of cannabis has increased significantly.

A recent review of relevant randomised controlled trials of cannabinergic pain medicines found 38 published trials, wherein 71% found some efficacy. These trials used approved cannabinoid medications, rather than smoked herbal cannabis, and found that while beneficial effects were achieved most trials were only short-term in duration and longer trials are needed in order to comprehensively gauge the therapeutic benefits of cannabinoids.

Over the past two decades cannabis has been made available, within various regulatory frameworks, for medicinal purposes in twenty two USA states and Washington DC, with no controls on the quality, dosage or safety of the product or its delivery system. In Australia, the debate about the legalisation of cannabis for medicinal or recreational purposes has also been growing.
CANNABINOIDS

There are three broad types of the diverse class of chemical compounds known as cannabinoids:

1. Phytocannabinoids (plant forms)
2. Endocannabinoids (produced naturally in the bodies of humans and animals), and
3. Synthetic cannabinoids that are chemically produced by humans and not derived from plants.

1. The phytocannabinoids are comprised of the three best known varieties of the cannabis plant Cannabis sativa, Cannabis indica and Cannabis ruderalis. Cannabis sativa is by far the most common as it has the highest levels of the strongest psychoactive compound delta-9-tetrahydrocannabinol, commonly known as THC. Agricultural processes have succeeded in refining the types of cannabis plants (females bred alone, hydroponic methods) harvested to maximise the THC content. Indeed, trends in the cannabinoid profile of cannabis over the past two decades have biased contemporary cannabis towards high THC and low Cannabidiol (CBD) content. Recent NSW research into the cannabinoid profile of cannabis has indicated high levels of THC (around 15%) and negligible (<1%) levels of CBD. While there is enormous variability in the level of these cannabinoids (commonly referred to as cannabis potency), some data do indicate that CBD may ameliorate or inhibit the psychotogenic, anxiogenic and memory-impairing effects of THC.

2. Endocannabinoids are chemicals that occur naturally in the human body. Following the discovery of the bioactive compound in cannabis it was determined that THC acted by binding to specific plasma membrane proteins labelled the ‘cannabinoid receptors’. Although the existence of several receptors for THC and/or its synthetic analogues are suspected based on pharmacological data, to date only two cannabinoid receptors have been cloned and both are members of the G-protein coupled receptor (GPCR) family. These receptors are called the CB1 receptor and the CB2 receptor. The CB1 and CB2 receptors have been found in the brain in the basal ganglia, cerebellum, neocortex, hypothalamus, hippocampus and cortex. They are also found in immune cells and tissues. Endogenous cannabinoid receptors have also been found in the reproductive organs and other areas of the body.

The two most studied endocannabinoids are anandamide (N-arachidonoyl ethanolamine) and 2-arachidonoylglycerol (2-AG). These endocannabinoids operate at the CB1 and CB2 receptors. The mechanisms that operate at these receptors are very complex and our understanding of the way cannabinoids function in the body is progressing. Of the more than 80 cannabinoids that have been identified in the cannabis plant, only the metabolism of THC, cannabidiol (CBD) and cannabiol (CBN) have been researched to any extent. CBN has no affinity for CB1 and CB2 receptors but acts as an indirect antagonist of cannabinoid agonists. Recently it was found to be an antagonist at the putative new cannabinoid receptor, GPR55, in the caudate nucleus and putamen. CBD has also been shown to act as a 5-HT1A receptor agonist, an action which explains its antidepressant, anti-anxiety, and neuroprotective effects. Additionally, CBD has been shown to inhibit cancer cell growth in cell cultures with low potency in non-cancer cells, although this inhibitory mechanism is not yet fully understood.

3. Synthetics Pharmaceutical preparation of the plant for research and clinical purposes has enabled the constituent components to be adjusted for research purposes to investigate which combinations of the constituents provide the best treatment for differing medical conditions. This is critical as it is the psychoactive components and the balance of the constituents and the route of administration of the drug that create the risk of harm to self and others (dependence, cognitive impairment, psychological impairment in terms of paranoia, anxiety, depression and impaired judgement when driving or working, hepatic, respiratory and cardiac harms). There have been different cannabis products developed and these include Dronabinol/Marinol, Cesamet, Cannador, and Sativex. Donabinol/Marinol is an oral synthetic cannabinoid preparation that has been used since 1985. Cesamet/Nabilone is a synthetic cannabinoid analogue purported to be more potent than natural THC. Cannador is an oral capsule containing a cannabis extract, with reportedly a 2:1 ratio of THC to CBD, however the exact THC to CBD ratio has not yet been standardised. Finally nabiximols, marketed as Sativex is a botanical oromucosal cannabinoid based spray, with one spray delivering a fixed dose of 2.7 mg THC and 2.5 mg CBD.
CANNABIS AS MEDICINE

Almost all of the modern research literature on cannabinoids as medicine have utilised pharmaceutical preparations of THC and/or CBD. There have been no published human trials employing the accepted gold standard design of a randomised controlled trial using smoked whole plant. The cannabinoid pharmaceutical preparations that have been developed have been used to treat a range of conditions such as chronic/acute pain, nausea, HIV and cancer-related wasting and spasticity associated with Multiple sclerosis.

• Chronic/acute pain
  Cannabis preparations have been used to treat many different types of pain including neuropathic pain, postoperative pain, chronic unexplained pain, fibromyalgia, rheumatoid arthritis, and the pain associated with Multiple sclerosis and cancer.17-24
  Most of the studies have used cannabis in cases where traditional front-line medications have proven ineffective.4 The studies focusing on pain have found some benefits, particularly for neuropathic pain, although there is some question about the generalisability of the results due to self-selection bias and other weaknesses of the studies reported.25,26 This fact, combined with the side-effects that have been recorded, necessitate further examination of these substances for this indication.

• Nausea and vomiting in patients with cancer and to stimulate appetite in patients with HIV or cancer
  Synthetic cannabis preparations have been used to treat nausea and vomiting in cancer and HIV patients27,28 and as an appetite stimulant therapy for the weight loss associated with these conditions. A recent Cochrane review of the studies conducted on HIV/AIDS patients call for stronger evidence to support the use of this substance in these conditions.27 A review of randomised clinical trials of synthetic cannabinoids versus placebo or conventional anti-emetic drugs concluded that while side effects were more intense, patients reported superior anti-emetic effects from cannabinoids.65

• Spasticity, muscle cramps and nerve pain associated with Multiple sclerosis and Parkinson's disease
  This is the area that has received the most research attention in recent years. Numerous studies have examined the impact of cannabis preparations on spasticity and pain associated with Multiple sclerosis and Parkinson's disease.29-33 Overall there has been mixed results in terms of objective and subjective reports of symptom relief.26,30 Recently nabiximols (Sativex) has been trialled in these conditions with some success and minor adverse effects34, particularly for the relief of spasm symptoms.
  As a result, nabiximols is registered in many countries for this indication, where first line treatments have not been effective.

• Glaucoma
  There is some evidence to suggest a therapeutic effect of cannabis preparations for the relief of glaucoma. Typically oral or intravenous dosing has been used and this produces a short-lasting effect. Continual dosing overcomes this handicap, however, it also produces unwanted side effects. Water soluble preparations are yet to be forthcoming.66 Available medications are generally more effective than cannabis preparations for this condition. In a study of 20 ophthalmologists approved to prescribe cannabis as either oral THC or smoked whole plant for end-stage glaucoma, found that over two years no patients consented to receive smoked cannabis and only 9 oral THC. Less than half of these patients (4/9) achieved their therapeutic goal and all patients experienced side effects.66

• Cannabis withdrawal
  Recently in Australia, nabiximols has been trialled for the inpatient management of cannabis withdrawal and found to be safe and to have a positive effect on withdrawal symptoms, period of withdrawal and treatment retention.66 Much more research is required into the use of cannabinoids in the management of cannabis withdrawal and cravings management.

• Epilepsy
  The endogenous cannabinoid system is known to be involved in regulating neuroexcitation. Laboratory studies of cannabinoids, particularly cannabidivarin (CBDV) and CBD have demonstrated anti-convulsive properties, however, the human clinical research is very small and contradictory.2 THC alone in any form is considered unlikely to yield therapeutic benefit for patients with epilepsy.67 There are currently trials underway assessing CBD for the management of
severe early-life seizure disorders such as Dravet and Lennox-Gastaut syndrome.

- Inflammatory bowel disease
  While there have been various anecdotal reports of the use of cannabis for inflammatory bowel diseases and plausible putative biological mechanisms for its method of action, there are no large randomised controlled trials. Once again, there is a need for rigorous studies to establish which cannabinoids, at which doses and mode of administration will maximise beneficial effects for Crohn’s Disease and related conditions and avoid potential harmful effects.69

ISSUES TO BE CONSIDERED

While its advocates make strong claims for smoked herbal cannabis as a first line treatment, and even cure, for a range of conditions including cancer37, cannabis and cannabinoids were primarily intended to be used as an adjunctive or second line therapy where standard treatment is ineffective or poorly tolerated.25 Studies of medicinal cannabis users in the US report that non-specific chronic pain is the most commonly reported reason for use.42 As a result of the early stage of the evidence base for the appropriate indications, dosage, length of treatment and regulatory regimes, the relevant medical workforces are currently conflicted.38

Regulation

There are many issues to be considered in the regulation of medicinal cannabis10-40 and many lessons to be learned from current regimes internationally.46
A particular issue for Australia, is our random roadside drug testing for THC and zero tolerance laws regarding testing positive for THC when driving. This makes it necessary for those receiving medicinal cannabis in any form, including nabiximols to refrain from driving for some hours after dosing.68

Delivery

One of the challenges in the move to legalise cannabis for medicinal purposes is overcoming the problems associated with inhaling cannabis smoke alone, or mixed with tobacco. Legalising the smoking of cannabis for medicinal purposes means that all of the risk factors of smoking (cardiovascular and respiratory and addiction to tobacco when mixed with the cannabis) remain. The harms associated with cannabis use include the enormous variation in the product in terms of the levels of THC and other cannabinoids, and unknown contamination from pesticides, heavy metals and microbes, as well as the delivery system (smoking with or without tobacco and vaporisation).

Diversion and risks to vulnerable populations

While it is early days in the availability of medicinal cannabis in most states in the US, there is some evidence to suggest that as availability increases in the community, children and adolescents are gaining easier access to the drug. This places these young people in the position of risks to physical and mental health in the longer term that have been documented in many studies.41-44

In the USA, there is mixed evidence on the effects of the availability of medicinal cannabis on levels of cannabis use in the general population.25,45,46 Two groups that have been identified as vulnerable include infants and animals. Edible cannabis products are frequently sweet and attractive to children such as brownies, ice cream and sodas. This is extremely concerning as it is much easier for infants and young children to overdose on THC leading to coma and the need for urgent medical care.47 This risk also extends to domestic pets with cases of severe illness and death associated with cannabis butter in particular.48 In addition, making products highly palatable is a marketing ploy successfully used by the alcohol industry to recruit young drinkers and is a concerning aspect of the cannabis commercialisation industry.

Harms

Harms resulting from smoking cannabis that have been reported in numerous studies include:

- Addiction49
- Adverse psychological effects including impaired judgement and thinking50
- Delusional thoughts, anxiety and depression, psychosis (all conditions that may persist)51-54
- Persistent cognitive decline43
- Physical problems including circulation (such as stroke and heart attack) and lung problems (chronic cough, sputum production, wheezing and
bronchitis) and some cancers55–58
• Financial problems59
• Interpersonal problems including conflict with friends and family and loss of social connections59
• Increased risk of suicide among some groups44,60
• Car accidents and accidents at work61–63

Younger age of initiation of cannabis use, as well as longer duration of use, increase the risk to individuals of the above adverse consequences.

**POTENTIAL BENEFITS OF CANNABINOIDS**

A number of studies using both smoked and pharmaceutical preparations of cannabis have been published over the last 30 years. Some modest success with this drug class has been reported treating a range of conditions, predominantly in the treatment of the symptoms of Multiple sclerosis.

A variety of human clinical trials have been performed using nabiximols in community settings, representing over 2,000 subjects with 1,000 patient years of exposure, with no evidence of tolerance, significant intoxication, or any form of withdrawal syndrome.24 Nabiximols have also been shown to have some success as an adjunctive treatment with patients suffering from brachial plexus avulsion,91 neuropathic pain in Multiple sclerosis (MS)92, rheumatoid arthritis93, peripheral neuropathic pain94 and pain associated with advanced cancer.95

Various studies in MS patients have shown that there is no habituation to the treatment and no withdrawal effect given the low doses used with nabiximols.24 To date, nabiximols presents the best hope for pharmaceutical cannabinoids as a second or third line treatment or as an adjunctive therapy.

**CONCLUSIONS**

When considering whether or not to legalise cannabis for medicinal purposes a distinction must be made between 1) the therapeutic potential of specific constituent compounds found in the cannabis plant delivered in controlled doses via non-toxic delivery systems, and 2) the effects of smoking cannabis on both the user and the wider society. As an Australian cost-benefit analysis of a legalised-regulated model of cannabis availability predicted a 35% increase in the prevalence of use, this should also be considered in any model for regulated medicinal use.44

Drug approval must be considered in the context of public health, particularly for controlled substances. Cannabis has been proven to be an addictive drug. Consuming cannabis has been shown to cause cognitive impairment as well as increasing vulnerability to psychological harms among users. Consuming cannabis and then driving or working also increases the risk to the user and also to the general public through traffic accidents and workplace incidents. Smoking cannabis has been associated with cardiac and respiratory tract morbidity as well as a form of testicular cancer.

Considering the results of the many clinical and experimental studies in humans involving pharmaceutical preparations of cannabis extracts, it is logical that selected and targeted manipulation of the cannabinoid system is preferable to treatment with a whole, unregulated, variable dose and contaminated cannabis product with an unsafe delivery system. The only way research can be communicated clearly about cannabis is to use reliable and standardised methods to understand the composition of various cannabis preparations. "Ideally a comprehensive overview of the cannabinoid content (i.e. the chemical fingerprint) of cannabis preparations used in studies should therefore be a standard part of scientific reports on the effects of cannabis".2

Pharmaceutical preparations of cannabis can be delivered safely, are tested and subjected to strict regulatory control both in their preparation and administration, thereby reducing the harm potential both to the user and the wider society. As nabiximols are now licensed by the Australian Therapeutic Goods Administration for those with Multiple sclerosis associated muscle spasticity, this is the most promising type of cannabinoid preparation for clinical research, and if proven safe and effective, for medical prescription under supervision.

**CONFLICT OF INTEREST DECLARATION**

Jan Copeland has led an NHMRC project using nabiximols (Sativex) in the management of cannabis withdrawal. The medication was provided by GW Pharmaceuticals in the United Kingdom.

Drs Clement and Copeland are also currently conducting a study of the feasibility of the use of CBD in the management of cannabis withdrawal. Neither have received any direct or indirect financial support nor have any direct/known financial interest in any pharmaceutical company.
REFERENCES


THE ORIGINS OF CANNABIS

Medican Australia argues for the introduction of legally available medicinal cannabis, reflecting on its history as an often misunderstood and maligned substance.

Since cannabis is the only plant on the planet that yields both a drug and a useful fibre it’s no surprise that it has been used for thousands of years.

The earliest records date back to about 2700 BC when Chinese physicians were recommending a tea made from cannabis leaves to treat conditions like gout and malaria. Cannabis was already in use as early as 4000 BC in China as a source of cloth, rope, fibre and cooking oil. Around AD 200, Chinese physician Hua Tao wrote about using cannabis as part of what was probably the first anaesthetic.

The ancient Assyrians made use of cannabis and it is specifically mentioned on clay tablets found at the library of Assurbanipal. It, along with another 400 other drugs, comprised the whole of the Assyrian pharmacopoeia of its day. And here it should be pointed out that we obtain the word cannabis from the Romans who obtained it from the Greek word Kannabis, who in turn could have, and probably did, obtained it from the Assyrians. This would (if correct) make it one of the oldest words known to humans.

As far back as 3,000 years India has used cannabis for the relief of anxiety by ingesting the plant as food, still referred to as bhang today.

It was not until the middle of the nineteenth century that doctors in the west began to take an interest. WB O’Shaughnessy, a professor at the Medical College of Calcutta observed and studied its use in India. He began to use it with patients suffering from rabies, rheumatism, epilepsy, and tetanus. In a report published in 1839, he wrote that he had found tincture of hemp (a solution of cannabis in alcohol, taken orally) to be an effective analgesic. He was also impressed with its muscle-relaxant properties and called it “an anticonvulsant remedy of the greatest value.” O’Shaughnessy returned to England in 1842 and provided cannabis to pharmacists. Doctors in Europe and the United States soon began to prescribe it for a variety of physical conditions. Cannabis was even given to Queen Victoria by her court physician.

After cannabis was used freely for thousands of years, a major change in its history came in the early 20th century, when prohibitionists in the United States succeeded in getting the government to criminalise the drug, beginning with the Marijuana Tax Act of 1937. By the 1930s the word cannabis was seldom if ever used, and American newspapers had substituted it with the word marijuana. Some suggest that the lawmakers themselves were so confused by the wording that they did not even know they were outlawing a common medicine. And as the horror stories spread, more and more states passed prohibition laws.

America’s influence led to other countries following their stance. At first exceptions for medical uses were made but high taxes and other forms of harassment made it prohibitively expensive to even cultivate the plant.

As one large botanical and pharmaceutical dealer wrote to the DEA “I have decided to discontinue the collection and sale of the herb owing to the fact that it has been placed in the narcotic list by both State and Federal laws. “I have no cannabis and have not made any collection this season as practically all of the manufacturers and dealers whom I have done business with have decided to discontinue the use and sale of this herb.” – JT Huffman, of Manito, Illinois.

In 1942, under heavy pressure, Cannabis was officially removed from both the US Pharmacopoeia as well as the National Formulary. And by the late 1940s even the memory of its medical uses had been forgotten.

In 1938, the plant Cannabis sativa was outlawed in Australia as a result of a reefer madness-style campaign in Australian newspapers.
orchestrated by the US Bureau of Narcotics and its commissioner Harry J Anslinger. This campaign introduced the word ‘marijuana’ into Australia.

Marijuana was described as “a new drug that maddens victims”. It was an “Evil Sex Drug” which causes “its victims to behave like raving sex maniacs”. For this generation of Australians, cannabis was to be “the dreaded sex drug marijuana”.

This American renaming of cannabis to ‘marijuana’ meant that most Australians were unaware that this dreaded new drug was the familiar medicine cannabis, which they had used for many decades without concern.

In the 1960s, American anti-drug propaganda was widely distributed with the message that smoking marijuana would not only make you lazy and irresponsible, but that you were also out of touch with reality and a threat to national security.

In Australia, 1970’s cannabis use was considered as confined to groups, such as radical students, ‘hippie’ dropouts, and opponents of the Vietnam War. Australian conservatives launched a Nixon-style ‘War on drugs’. This war on cannabis was most extreme in Queensland where Queensland premier Bjelke-Petersen called for a police-crackdown to drive cannabis users out of Queensland. The result was the Cedar Bay raid on a commune in far north Queensland where houses were burnt to the ground and orchards chopped down as the Queensland police went on a rampage.

In 1988, American DEA administrative law Judge Francis Young finds, after thorough hearings, that cannabis has a clearly established medical use and should be reclassified as a prescriptive drug. His recommendation is ignored.

In 1996, California (the first American state to ban cannabis use in 1915 became the first American state to then re-legalise medical cannabis use for people suffering from AIDS, cancer, and other serious illnesses.

In 2003, Canada becomes the first country in the world to approve medical cannabis nationwide.

By 2014, numerous other countries have followed Canada’s lead and now have access to cannabis for medicinal use. These include 22 American states, Israel, North Korea, Portugal, Spain, Argentina, Belgium, Czech Republic, Italy and Iran.

Medicinal cannabis around the world

THE NETHERLANDS
Despite misconceptions, cannabis is illegal in The Netherlands, but possession of small amounts is not prosecuted and the drug is available from special ‘coffee shops’, though limits on tourists’ access to some of these shops were introduced last year. The Dutch government runs a program to supply cannabis to seriously ill patients through pharmacies and hospitals. The Bureau voor Medicinale Cannabis (BMC) licenses growers who must sell their harvest to the BMC and destroy surplus plants.

CANADA
Approved patients can buy cannabis from the government, grow their own, delegate someone to grow it for them or buy it from non-profit ‘cannabis clubs’, which are unlicensed but generally tolerated by police.

UNITED STATES
Medicinal cannabis use is allowed in 18 states, with the industry worth an estimated $US40 billion a year. In July 2014, Washington became the second state to fully legalise marijuana after Colorado.


Medicinal Cannabis Australia aims to be an Australian pioneer in providing premium grade cannabis-based medicine to people in need of the wellness benefits of medicinal cannabis. Our mission is to share the benefits of this versatile and miraculous plant by becoming one of Australia’s first commercially licensed producers of medicinal cannabis.

WHY MEDICINAL CANNABIS
Medican Australia asserts the health benefits of medicinal marijuana

There are over four hundred compounds in cannabis, including cannabinoids, terpenoids, and flavonoids. Each has specific medicinal attributes, which combine synergistically to create a holistic effect, so that the therapeutic impact of the whole plant is greater than the sum of its parts. About eighty of these compounds are only found in cannabis plants.

Cannabinoids relieve symptoms of illness by attaching to receptors found throughout the body: in the brain, organs, connective tissues, glands and immune cells. These receptors are named the endocannabinoid system (named after the plant that led to its discovery). The endocannabinoid system performs different tasks, but the goal is always the same: homeostasis (the maintenance of a stable internal environment).

There are 3 types of cannabinoids:
- Herbal: occur naturally only in the cannabis plant (phytocannabinoids)
- Endogenous: produced naturally by humans and other animals (endocannabinoids)
- Synthetic: cannabinoids produced in a lab.

Cannabinoids and disease
A lot of diseases actually are all just different symptoms of the same underlying root cause. They all develop because of a deficiency of cannabinoids. All vertebrates have an endocannabinoid system that regulates all bodily systems and helps every single cell type communicate with each other. A healthy body creates a steady stream of endocannabinoids to feed its internal cannabinoid receptors, and help everything in the body to work properly. A lack of well-fed receptors in any location will throw off normal bodily activities and cause cells to malfunction.

The cannabinoids in cannabis have the ability to replace a lack of endocannabinoids in a patient to feed this untapped bodily system and help the body to work better.


BENEFITS OF MEDICINAL CANNABIS
There’s no doubt that the natural world is a treasure trove of biologically useful compounds and cannabis is one of the most powerful healing plants on the planet. Cannabis has been found to suppress cancer, reduce blood pressure, treat glaucoma, alleviate pain and even inhibit HIV to name a few. It is an antioxidant, anti-inflammatory, analgesic (pain relief), antiemetic (relieves nausea and vomiting), appetite stimulant (induces hunger) and neuroprotective.

The negative misconceptions of cannabis are dispersing. It is time to embrace the benefits of this plant and give every Australian in need the opportunity to benefit from its brilliant healing properties.

“We are at the dawn of a new age in medicine and a new day for mankind. Not only can hemp save the world, it can eliminate a great deal of human suffering and can even put an end to starvation. What are we waiting for?” – Rick Simpson

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The Commonwealth government has announced plans to legalise growing cannabis for medicinal and research purposes in Australia, reports Nola Ries in this article first published by The Conversation.

The news follows the Victorian government’s announcement earlier this month that it will legalise access to medicinal cannabis products for patients with severe symptoms from 2017.

 Meanwhile, the New South Wales government will provide up to $A9 million to support cannabis clinical trials. It also launched the Terminal Illness Cannabis Scheme to allow people medically certified as terminally ill and their carers to register to use cannabis for therapeutic purposes.

But Australia is a signatory to three international drug control agreements, including the Single Convention on Narcotic Drugs 1961, which limit narcotic drug production, trade and use to medical and scientific purposes.

To legalise cannabis cultivation, the Commonwealth must be able to keep track of production and report to the International Narcotics Control Board.

Establishing what the federal health minister, Sussan Ley, calls “a safe, legal and sustainable” framework for regulating the supply of medical cannabis from the farm to the pharmacy will require cooperation between the Commonwealth, states and territories.

EXISTING LAWS

Cannabis and its products are regulated under various federal and state laws. But the states don’t have legal authority to set standalone rules for the cultivation of cannabis and production of medicinal products.

The recent Victorian Law Reform Commission’s report on medical cannabis recommended Victoria collaborate with the Commonwealth as this is the only practical approach to legalising medical access to the drug.

Several Commonwealth laws apply to cannabis. The Narcotics Drugs Act 1967 regulates the manufacture of narcotic products, including cannabis.

The Therapeutic Goods Act 1989 forms a national system for regulating medicines. Products listed on the Australian Register of Therapeutic Goods can be sold in Australia. And the Therapeutic Goods Administration (TGA) reviews the efficacy, safety and quality of a product before it is registered.

One cannabis-based drug, Sativex® (nabiximols), is currently registered for use by people with multiple sclerosis to help control muscle spasticity. The drug is not covered by the Pharmaceutical...
Benefits Scheme so it is costly and not readily available.

Federal customs laws regulate the import of cannabis into Australia, for instance, to be used in clinical trials. International sources of the drug for medical purposes are very limited, however, which is why a domestic supply is preferred.

**OFFENCE LAWS**

The Therapeutic Goods Act also sets a framework for drugs that states and territories adopt in their laws. Cannabis is a “prohibited poison” unless used for medicine or research.

Commonwealth, state and territory laws create offences for growing, possessing and selling cannabis. The severity of the penalty depends on the seriousness of the offence.

A person found in possession of a small quantity of the drug for personal use, for instance, may receive a warning or fine.

Under the NSW Terminal Illness Cannabis Scheme, police officers have discretion not to charge people authorised to possess and use cannabis to relieve their symptoms.

Such an approach is only a partial solution, though. Legal changes, such as the ones under discussion, are needed to support the production and supply of safe, quality cannabis crops and products.

Otherwise, people seeking the drug to help manage medical symptoms may buy it from illicit sources.

**A NATIONAL REGULATOR**

At the end of last year, the Regulator of Medicinal Cannabis Bill 2014 was referred to a Senate committee. The committee released its final report and recommendations in August.

The bill proposes a national regulatory body to set up a system to license people to grow cannabis for medical uses, manufacture medicinal cannabis products and supply regulated medicinal products to authorised patients.

Doing so would help Australia meet its international obligations under the *Single Convention on Narcotic Drugs*.

States and territories would enter an agreement with the Commonwealth to participate in the scheme.

The Regulator would identify where cannabis plants would be grown and issue licences for authorised cultivators. Cultivation under a national scheme would provide a source of raw materials needed to manufacture therapeutic cannabis products that meet quality, safety and dosage standards.

The bill also proposes a register for medicinal cannabis products that meet standards set by the law. This system would be separate from the Therapeutic Goods Act. But pharmaceutical companies could still choose to apply to the TGA to sell cannabis-based therapeutic products.

The regulator would also establish an authorised patients and carers scheme to allow medicinal cannabis use. Doctors would provide medical supervision for patients using regulated medicinal cannabis products.

The proposed Regulator of Medicinal Cannabis Bill will likely be put to Parliament in November.

Nola Ries is a Senior Lecturer at the University of Newcastle.

Three states join forces on cannabis oil in medical trials

- **19 April 2015**: The Queensland and Victorian state governments joined forces with New South Wales to take part in medicinal cannabis clinical trials.
- The NSW Government introduced the scientific trials in 2014 to help treat patients with drug-resistant and uncontrollable epilepsy.
- The new agreement means Victorians and Queenslanders suffering terminal or life-threatening conditions can also take part in the NSW clinical trials.
- The three trials are to be conducted by the NSW Government and will examine the use of cannabis in providing relief for patients.

Victoria to legalise medical marijuana

- **6 October 2015**: In an Australian first, the Victorian Government announced it would legalise marijuana for the treatment of medical conditions including cancer, chronic pain and epilepsy.
- The decision was based upon a report by the Victorian Law Reform Commission which recommended licensing Australian-based cultivators and manufacturers to develop a range of products, including oils and sprays, to be sold in pharmacies.
- The trial hinges on support from the Federal Government as a signatory to an international convention on narcotic drugs.
- The report was driven by compassion for people, including chronically ill children, who were suffering and had no effective medical relief.
- Children with severe epilepsy would be the first to be treated with Victorian-grown medicinal cannabis, from 2017.
- The commission has made 42 recommendations, including that medicinal cannabis be available to treat five serious conditions, including multiple sclerosis, cancer, HIV or AIDS, epilepsy and chronic pain.
- A significant number of people were already using cannabis for medicinal purposes in Victoria, however they have been doing so illegally and in fear of prosecution and embarrassment.
- The State Government will begin a cultivation trial at a research facility and establish an Office of Medicinal Cannabis within the Department of Health and Human Services to oversee the manufacturing, dispensing and clinical aspects of the framework.
- The Victorian and Queensland state governments have already joined forces with New South Wales to take part in medicinal cannabis clinical trials, however the commission deemed it inappropriate for patients to wait years for the results and Therapeutic Goods Administration approval of pharmaceutical products.
- The commission said there would be a rigorous licensing scheme, to reduce the risk of organised criminals benefiting from medicinal cannabis production.
- While the plan needs the support of the Federal Government, Commonwealth legislative change is not required, the commission said.
- The Victorian Government has accepted 40 of the report’s recommendations and two in principle.
- An independent medical advisory committee will examine whether to increase the number of eligible patients.

**Marijuana conditions of use:**
- Severe muscle spasms or severe pain from MS
- Severe pain from cancer, HIV or AIDS
- Severe nausea, vomiting or wasting from cancer, HIV or AIDS
- Severe seizures from epileptic conditions (if other treatments do not work)
- Severe chronic pain where two specialist medical practitioners think medicinal cannabis might work better than other medical options (Source: Victorian Law Reform Commission).

NSW trials medical marijuana on children with severe epilepsy

- **27 October 2015**: In a world first, children in New South Wales who suffer from severe epilepsy will trial a new cannabis-derived drug and have access to a secure supply of medicinal cannabis from early 2016.
- The NSW government announced a $3.5 million commitment and partnership with British-based GW Pharmaceuticals, describing the moment as an historic day for the state and for the hundreds of families across NSW who live with the debilitating effects of drug-resistant epilepsy.
- Compassionate access to medicinal cannabis Epidiolex, which has shown positive results in epilepsy trials in the United States, will be available from early 2016. A second cannabis-derived drug, CBDV, will for the first time be trialled on epileptic children.
The breakthrough came after five years of campaigning with attention being drawn to the fact that Australia was well behind the United States in the field of medical cannabis use.

The epilepsy trials form part of the state’s $9 million research into medical cannabis which were announced by the Premier Mike Baird in December 2014.

Adults with terminal illness and people with nausea induced by chemotherapy are also involved in the research.

**Federal medicinal cannabis scheme legislation passes**

- **24 February 2016**: Medicinal cannabis will be legally grown in Australia, with changes passed to create a national licensing scheme for growers.
- Parliament has passed historic legislation delivering the ‘missing piece’ for Australian patients and their doctors to access a safe, legal and reliable supply of medicinal cannabis products for the management of painful and chronic conditions.
- The Department of Health, Therapeutic Goods Administration (TGA), State and Territory Governments, and patient representatives engaged in consultation on the legislation prior to its introduction into Parliament, which ensured it passed quickly without amendment.
- The passing of amendments to the *Narcotic Drugs Act* will, for the first time, provide a pathway of legally-grown cannabis for the manufacture of suitable medicinal cannabis products in Australia.
- A national regulator will allow the Government to closely track the development of cannabis products for medicinal use from cultivation to supply and curtail any attempts by criminals to get involved.
- The legislation also ensures Australia meets all of its international obligations under the *Single Convention on Narcotic Drugs*.
- It is recognised that, while there are existing mechanisms by which medicinal cannabis products from overseas can be accessed under Australian law, limited supplies and export barriers in other countries have made this difficult.
- Under this scheme, a patient with a valid prescription can possess and use a medicinal cannabis product manufactured from cannabis plants legally cultivated in Australia, where the supply is appropriately authorised under the *Therapeutic Goods Act 1989* and relevant state and territory legislation.
- To support this, Minister for Health Sussan Ley also announced the Department of Health, in conjunction with the TGA, was currently well-advanced in having cannabis for medicinal purposes considered for down-scheduling to Schedule 8 of the Poisons Schedule. This will simplify arrangements around the legal possession of medicinal cannabis products, placing them in the same category as restricted medicines such as morphine, rather than an illicit drug. This will in turn reduce any barriers to access, no matter what state a patient lives in.
- An independent Advisory Committee will be established to oversee the next stage of the rollout of the national regulator now legislation has passed.
- This announcement does not relate to the decriminalisation of cannabis for recreational use, which remains a law enforcement issue for individual states and territories.
TRIALS A STEP FORWARD FOR MEDICINAL CANNABIS BUT WHAT COMES NEXT?

The three states will collaborate on the development of medicinal cannabis, its regulatory framework and clinical research. So, how would such a scheme work in Australia? And what hurdles must first be overcome, asks David Penington

Queenslanders and Victorians with particular chronic illnesses may now be eligible to join New South Wales medicinal cannabis trials, due to start mid next year.

The three states will collaborate on the development of medicinal cannabis, its regulatory framework and clinical research to explore the safety and benefits of the product among three key groups:

• Children with severe epilepsy who haven’t responded to traditional medicine
• Adults with painful terminal illnesses
• Cancer patients with severe nausea from chemotherapy.

This welcome move comes after many years of lobbying to reverse the embedded opposition to medicinal cannabis and recognises the product as a valid way of relieving the suffering caused by some distressing conditions.

So, how would such a scheme work in Australia? And what hurdles must first be overcome?

Countering the opposition

Some opposition to medicinal cannabis is based on a lack of understanding of the science of cannabis and emerging practices internationally. As cannabis has been illegal, there has been a shortage of pharmaceutical evidence of the kind usually accompanying the introduction of new treatments.

Many others oppose medicinal cannabis on irrational grounds, preferring to see any cannabis use as ‘immoral’, and have no interest in looking at the evidence.

Free and excessive use of cannabis certainly causes problems. This is especially true for young people using cannabis while their forebrain is still developing, between the ages of 15 and 25. Heavy users drop out of education and lessen their intellectual capacity, curbing career options for life.

Hastened onset of psychosis occurs in the small number of users with a genetic predisposition. However, it is irrational to see this as a reason to reject medicinal cannabis when carefully planned processes to guard against these problems are under consideration in the three trial states.

What is medical cannabis?

Pain specialist and lecturer Michael Vagg recently wrote on The Conversation that medicinal cannabis was no more than treatment of patients with tetrahydrocannabinol (THC). THC is known to accelerate psychosis in people with certain genetic tendency to it.

This ignores mounting evidence that a second important component, cannabidiol (CBD), plays a critical role. It opposes the effects of THC on the brain’s endogenous cannabinoid receptor CB1.

Illicit ‘skunk’ cannabis, currently favoured in Australia, does have a high content of THC and little or no CBD, responding to market demand from people seeking to feel ‘stoned’ with heavy use.

‘Hash’ cannabis, however, has large amounts of CBD, frequently more than THC. Popular in London, it has been shown to have no association with psychosis. This indicates the ready possibility of providing a ‘safe’ product.

The pressing case is to provide relief for people suffering severe pain from inoperable cancer, who find the endless administration of morphine, to which they become addicted, as an intolerable way to end their lives.

CBD does not produce excitement of the kind experienced with high-dosage THC, but has a calming influence, relieves pain and has, in recent years, been shown to improve symptoms in people developing psychosis.

CBD is reportedly the key component in new strains of C.sativa, bred specifically to produce relief for intractable forms of juvenile epilepsy called Dravet or Lennox-Gastaut syndromes. Clinical trials with concentrates of CBD are in progress.

The case for medical cannabis

The pressing case is to provide relief for people suffering severe pain from inoperable cancer, who find the endless administration of morphine, to which they become addicted, as an intolerable way to end their lives.

A ten-year study from US states with medicinal cannabis programs showed there were many fewer deaths from overdose due to opioid drugs, used by distressed people seeking additional drugs for relief from interminable morphine treatment, than states without medicinal cannabis laws.

An objective trial of a cannabis derivative known as Sirtex, with equivalent content of THC and CBD, showed it to be effective in pain relief for such people. A
large international multi-centre trial in cancer patients in currently in progress.

Although approved in the United Kingdom for pain relief in Multiple sclerosis, Sirtex is costly, as are similar products used in Holland, Italy and now in Canada. If too costly, people will fall back on illicit cannabis.

How would an Australian scheme work?
The premiers of New South Wales, Queensland and Victoria support introducing medicinal cannabis, beginning with the trials.

My view is this should entail the provision of a regulated ‘cannabis’ supply with ample content of CBD – equal or greater than that of THC – for cancer patients.

Medicinal cannabis will need to be a regulated substance available for use by people with designated medically approved conditions, with state legislation securing the oversight of use, marketing, production and manufacturing, subject to Commonwealth agreement under the Narcotic Drugs Act. Such a structure already applies to opium to produce morphine.

David Penington is Emeritus Professor at the University of Melbourne.

MEDICAL CANNABIS:
NORFOLK ISLAND DECISION SPARKS RENEWED CALLS TO LEGALISE DRUG FOR AUSTRALIAN PATIENTS

A decision to grant a licence to grow medicinal cannabis on Norfolk Island has sparked renewed calls for the drug to be made available to Australian patients.

An ABC News report by Mandie Sami

Cannabis producer AusCann has become the first Australian company to be granted a licence to grow and export medicinal cannabis to an international market.

The company intends to grow medicinal cannabis on Norfolk Island and export it for sale in Canada.

The company said it hoped it would soon be able to export medicinal cannabis to mainland Australia, with legislation due to come before Federal Parliament in the coming months.

Medicinal marijuana is still illegal in Australia, but many argue that has to change given the growing anecdotal and scientific evidence of its medicinal benefits.

AusCann founder Troy Langman says the company intends to export its entire first crop by the middle of next year and ramp up production from an initial one tonne to 10 tonnes by 2018.

"Obviously it’s very exciting that we get the opportunity to be the first company in Australia to produce medicinal cannabis," he said.

"I guess for me one of the important things is that I’m pleased that it will be an opportunity for Norfolk Island.

"It’s a place that my family lived for many years. They desperately need employment and industry so I guess I’m mostly pleased for them."

The Federal Government’s Norfolk Island administrator Gary Hardgrave still has the power to stop the project from going ahead.

Mr Hardgrave vetoed a licence in 2014, citing safety and security concerns, but Mr Langman said he was confident this time would be different.

"The issue has advanced significantly since then, so I’m hopeful that this time around we might be allowed to proceed," he said.

Mr Langman said frustration was building among Australians who wanted access to medicinal marijuana.

"I’m Australian and when I set out to do this in the beginning, I was doing this for Australia... not that of course any human in the world is less worthy, but it would be certainly my dream to be able to help people in the country in which I live," he said.

Greens say laws in Australia need changing

Lucy Haslem has been a vocal campaigner for the legalisation of medicinal marijuana since her son Daniel used it for relief after being diagnosed with cancer.

It frustrates her that an Australian company is making medicinal cannabis available overseas, while it is still inaccessible to Australians.

"I’ve learnt to be really patient I suppose. I’ve just learnt that we’re so tied up in bureaucratic red tape in this country that nothing happens quickly," she said.

"For Daniel, it didn’t happen quick enough and for a lot of people it’s not happening quick enough, but I do know that there are things happening behind the scenes that hopefully will evolve over the next couple of months and get us into a place where it’s a level playing field for patients that need it.”

Australian Greens leader Dr Richard Di Natale said it was beyond belief that an Australian company doing so much overseas in this area was unable to help Australians.

"It just demonstrates that we need to change the law here in Australia. We need to ensure that people who would get benefit from medicinal cannabis should be able to get access to it, and in fact I’ve got a bill before the Parliament that would allow that to happen.”

Senator Di Natale is urging Prime Minister Tony Abbott to promise his support for the bill.

"I’ve been encouraged by the level of support I’ve had from members... on all sides of politics," he said.

"I’m really urging the Prime Minister to get behind this legislation. It’s legislation that’s modelled on the best examples of what goes on internationally, [it] makes it very clear that we’re going to treat this separately from the issue of recreational cannabis, that we will have a very strict framework for licensing people to grow it,” he said.

Senator Di Natale said the evidence on medicinal cannabis’s benefits was clear.

"We’ve got to make sure now we just come into the 21st century, support the legislation that I’ve got in the Parliament, and make this a reality for those people who are suffering.”

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What needs to happen now to get medicinal cannabis to those who need it?

Legislation has been introduced (and subsequently passed) for the growing of medical marijuana – but what’s next to actually get it to patients, asks Alex Wodak

This week minister for health Sussan Ley tabled amendments to our drugs act to allow growing cannabis for medicinal or scientific purposes.

The amendments will create two licence classes (medicine and research), limit access only to “fit and proper” Australians with no ties to crime, and allow the importation of plants and seed. This is an important milestone intended to (re)introduce lawful medicinal cannabis in Australia, after it was prohibited some 50 years ago.

Several further steps are required before people with distressing symptoms from conditions for which conventional medicines have been ineffective can obtain some relief from medicinal cannabis. These conditions include cancer, epilepsy and Multiple sclerosis.

The House of Representatives and Senate are expected to approve the proposed amendments. Almost two-thirds of the community have supported medicinal cannabis for many years.

The government seems, sensibly, to prefer a single national system for medicinal cannabis rather than see eight different state and territory systems. There has been considerable negotiation between the Commonwealth, states and territories to this end. More will be needed.

WHAT NEXT?

First, as there is no current law allowing medicinal use of cannabis in Australia, some legal changes are needed. Under Commonwealth law, cannabis is now in Schedule 9 of the Poisons Standard, the most restricted category. This means cannabis cannot legally be used for medicinal purposes including being prescribed by a doctor.

The Commonwealth government is consulting on shifting cannabis from Schedule 9 (Prohibited Substance) to Schedule 8 (Controlled Drugs) to enable the drug to then be prescribed by doctors for patients. This may also require the states and territories to undertake some similar changes. The government is also ensuring the provision of medicinal cannabis will not breach Australia’s international drug treaty obligations.

Second, decisions are needed about how medicinal cannabis will have to be stored. Restricting medicinal cannabis only to hospital pharmacies will severely limit utilisation of the drug. But there is still some resistance to community pharmacies being allowed to store it. Unless lawful medicinal cannabis is made reasonably accessible, including in community pharmacies, current strong demand will continue to be met largely by an unregulated black market.

Third, decisions will have to be made about the sorts of patients allowed to be prescribed medicinal cannabis, about the doctors allowed to prescribe the drug, whether any training would be required before doctors are approved and what formulations of medicinal cannabis will be allowed.

Some are confident all of these matters will be resolved before the end of the year, enabling a system of routine care involving...
medicinal cannabis to commence operating in 2016.

But this will require action from the Commonwealth to engage with GPs and pharmacists through their professional bodies to identify and resolve outstanding issues with the supply chain at the point where it should be delivering to patients. Several research projects involving medicinal cannabis in NSW, Queensland and Victoria will commence soon.

One of the unresolved problems is the eight state/territory drug driving laws. These enable police to perform roadside testing of oral fluid for THC (cannabis), methamphetamine and MDMA.

No proof of driving impairment is required to support a conviction by the courts. Penalties for convicted drivers in some jurisdictions are quite severe involving a fine of over A$1,000 and a driving license disqualification of six months.

For elderly people from rural areas dying of cancer, these are very significant penalties. At present, there are no plans to amend the drug driving laws for people lawfully taking medicinal cannabis under medical direction.

DECRIMINALISING CANNABIS?

Ley said the legislation tabled did not relate to the decriminalisation of cannabis for general cultivation or recreational use adding:

“If states wish to decriminalise cannabis, then that’s entirely a matter for them.”

How lawful medicinal cannabis is provided cannot be considered without also taking into account the recreational use of the drug. The more restricted the availability of medicinal cannabis, the more patients will utilise unregulated black market supplies and vice versa.

This is a very significant statement for several reasons.

First, it recognises the reality that in many of the countries that have allowed medicinal cannabis, a debate has soon developed about regulating the recreational use of the drug with growing community support soon forcing politicians to allow regulation.

Second, it seems to accept that while the decision to start allowing medicinal cannabis is separate from any decisions regarding the prohibition of recreational use, how lawful medicinal cannabis is provided cannot be considered without also taking into account the recreational use of the drug. The more restricted the availability of medicinal cannabis, the more patients will utilise unregulated black market supplies and vice versa.

The good news is that the process of providing legislative and policy framework for lawful medicinal cannabis in Australia has at long last started. But we still do not know when and how that framework will operate.

Alex Wodak is Emeritus Consultant at St Vincent’s Hospital, Darlinghurst.

THE CONVERSATION

IS THE MEDICAL MARIJUANA DEBATE EVEN WORTH HAVING?

Do we need any more trials looking at hemp oil or other currently available forms of cannabinoids? Not really, asserts Michael Vagg

Given the recent thawing in political attitudes in New South Wales and Victoria towards so-called medical marijuana, one could be forgiven for assuming that the medical care of certain individuals is being disadvantaged by the lack of access to THC (tetrahydrocannabinol) products. One of the most frequently cited reasons for legalising marijuana for medical use is its efficacy for chronic pain.

By way of background, there is no dispute scientifically that molecules derived from marijuana (cannabinoids) are involved in pain signalling. The class of biological molecules that activate this system are called endocannabinoids and their biological activity is very complex. The sheer complexity of these actions is essentially the problem with finding suitably safe and effective medications for pain.

There is an enormous amount of crossover from pain regulation into other brain functions such as motivation, memory, appetite and thermoregulation (body temperature control). The basic science is complex, and clinical trials to date have been disappointing. This usually suggests we have more to learn before a treatment is ready for adoption. When we have the clinical pharmacology of a drug nailed down, the results in trials are usually clear cut successes.

If you want a slightly technical but very accurate and balanced view of the current state of the evidence regarding the risks and benefits of cannabinoids in pain, you can read the lecture notes at www.fpm.anzca.edu.au/about-fpm/pdfs/Michael%20Cousins%20Lecture.pdf. If you don't have the time or inclination, the summary of the serious literature is as follows:

- The evidence supporting efficacy in neuropathic pain or any type of chronic pain is mixed, and the basic question of whether it really works is a long way from settled.
- The most generous estimate of the effect size for THC-derived products in clinical trials to date is small. Simply put, THC-derived products are about as useful as paracetamol for pain.
- There are significant concerns that lifetime consequences can occur from periods of exposure to THC-derived products, particularly in adolescence and young adulthood.
- Currently available prescription products such as Sativex do not have evidence supporting their efficacy in pain conditions that would qualify them for serious consideration. They do have evidence of side effects and potential harm, like all prescription drugs.

Is more research needed? Yes, I think much more research is needed into endocannabinoids ... Do we need any more trials looking at hemp oil or other currently available forms of cannabinoids? Not really.

The situation regarding hemp oil and other ‘cotage industry’ products is even less encouraging. There is no compelling evidence that stronger preparations are better for pain relief than the relatively less potent ones available on prescription. The quality and safety of such products is unregulated and does not deserve any sober consideration as a useful treatment for pain. They may be highly regarded by connoisseurs but they don’t even approach the benchmarks for ethical prescribing.

Is more research needed? Yes, I think much more research is needed into endocannabinoids to identify more promising targets for new drugs. Do we need any more trials looking at hemp oil or other currently available forms of cannabinoids? Not really. We would probably get better value for increasingly scarce research dollars by looking at other more promising treatments.

Michael Vagg is a Clinical Senior Lecturer at the Deakin University School of Medicine and Pain Specialist at Barwon Health.
OLD DOPE, NEW TRICKS: THE NEW SCIENCE OF MEDICAL CANNABIS

Cannabis has its own positives and negatives – but if we’re clever about our use, then it can be a most valuable therapeutic, argue David Allsop and Iain McGregor

Medicinal cannabis is back in the news again after a planned trial to grow it in Norfolk Island was blocked by the federal government last week. The media is ablaze with political rumblings and tales of public woe, but what does science have to say on the subject?

Well, an article just published in the prestigious journal *JAMA Internal Medicine* provocatively suggests that US states with medical cannabis laws have dramatically reduced opioid mortality rates.

So the science is clearly every bit as alive and kicking as the political bluster, but rests on firmer, less emotive grounds. This is what we know: somewhere in that much-incinerated plant lies valuable medicine – perhaps a treatment for cancer or an antidote to obesity.

In fact, cannabis science is one of the fastest moving frontiers in pharmacology and has accelerated by the realisation that we’re all already marinated in cannabis-like molecules (endocannabinoids) and their receptors. Endocannabinoids help regulate many physiological processes: mood, memory, appetite, pain, immune function, metabolism and bone growth to name a few (there are even cannabinoid receptors in sperm).

Consuming cannabis modulates this endocannabinoid system in many ways. And the effects can be benevolent, although sometimes problematic.

CANNABIS’ CHANGING FORTUNES

Humanity has used cannabis as medicine for thousands of years; the current era of prohibition is a historical aberration. But murky politics has seen a plant that has been widely utilised for clothing, fuel, food, fibre and medication ostracised – from nautical rope to killer dope.

Now, the pendulum is swinging back. Cannabis is legal in two of the United States of America, and a prescribed medicine in a further 23. Many other countries are also rapidly revising their attitudes.

In 2013, the NSW parliament convened a medical cannabis inquiry, the current NSW premier Mike Baird is a supporter, as is shock-jock Alan Jones.

Somewhere in this much-incinerated plant lies valuable medicine: perhaps a treatment for cancer or an antidote to obesity.

But if we’re going to rediscover the therapeutic value of cannabis – and we probably should – then there’s much to be gained from examining recent developments in cannabinoid science.

Cannabis contains more than 120 different cannabinoid molecules. But, as far as we know, only one gets you stoned: THC. The plant contains a cornucopia of non-psychoactive, non-intoxicating THC cousins with
emerging medicinal potential.

Their abbreviated names resemble a bad Scrabble hand: CBD, CBG, THC-V, CBC, and CBN to mention a few. These have the potential to heal without making you a paranoid, gormless grinner.

**Cannabidiol is bred out of street cannabis in Australia.**

**USEFUL COUSINS**

Cannabidiol (CBD) is perhaps the most interesting of the lot: a non-intoxicating cannabinoid that is present in variable amounts in different cannabis samples and moderates the actions of THC in the brain. Smoking high-cannabidiol weed appears less likely to cause psychosis, paranoia and cognitive impairment than low-CBD varieties.

Cannabidiol given alone has antipsychotic effects as efficacious as standard anti-psychotic drugs but with fewer side effects. It also has remarkable effects in treating intractable childhood epilepsy that cannot be treated with conventional anti-convulsants.

Cannabis plants appear genetically programmed to produce THC or CBD. But our recent analysis shows cannabidiol is bred out of street cannabis in Australia. Bringing it back may maximise cannabis’ medicinal potential and lessen the adverse mental health consequences of smoking weed.

The cannabinoid molecule that causes the high from cannabis, THC, mostly exists in plants as non-psychoactive THC-A (more than 80% of plant THC is in the form of THC-A). Cannabis must be heated above 170 Celsius to transform THC-A into the psychoactive THC. This is why pleasure seekers smoke, bake or vaporise their weed.

THC-A is anti-inflammatory and neuroprotective, and if plant material is ingested without heating, for example by juicing, then non-psychoactive THC-A effects are maximised and intoxication minimised. This also reduces the long-term hazards involved in smoking.

THC-V is another non-psychoactive cannabinoid that may actually block cannabinoid receptors, reducing appetite and the tendency to store fat, and making it a potentially wonder treatment for obesity.

One cannabis-derived product is already approved in Australia; Sativex oral spray contains equal amounts of THC and CBD. Absorbed across the mucous membranes of the mouth, Sativex reduces muscle spasms in multiple sclerosis. The route of absorption gives low and steady levels of THC and CBD in blood, in contrast to the often-disorienting THC tsunami obtained with smoked cannabis.

In our recent study, cannabis users given high doses of Sativex in a Cannabis Replacement Therapy clinical trial could not discriminate it from placebo, and reported little intoxication.

**REDISCOVERING CANNABIS**

We now know that the right cannabinoids, prepared and administered appropriately, might deliver medical benefits while minimising intoxication. So there’s certainly no good scientific rationale for prosecuting those supplying high CBD strains, or preparations that maximise consumption of THC-A, THC-V or other non-psychoactive cannabinoids.

Indeed, blindly scheduling the bad-scrabble cannabinoids in the cannabis regulatory bracket limits future research.

Even THC is a legitimate target for ongoing medical research, particularly when dosed in forms that give slow and steady blood levels.

THC clearly has important therapeutic effects in Multiple sclerosis and pain, in stimulating appetite in HIV or cancer patients, and even for anxiety disorders, such as post-traumatic stress disorder.

No medicine is perfect: opiates control pain but may be addictive and constipating; antidepressants lift mood but may numb you out and ruin your sex life; statins can lower your cholesterol but can cause muscle wastage. All drugs are poisons, it’s just a matter of the dose you’re taking.

Cannabis has its own positives and negatives, and the risks involved in its regular use, particularly during adolescence, continue to be well ventilated. But if we’re clever about our use, then it can be a most valuable therapeutic: a voyage of rediscovery is long overdue.

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WORKSHEETS AND ACTIVITIES

The Exploring Issues section comprises a range of ready-to-use worksheets featuring activities which relate to facts and views raised in this book.

The exercises presented in these worksheets are suitable for use by students at middle secondary school level and beyond. Some of the activities may be explored either individually or as a group.

As the information in this book is compiled from a number of different sources, readers are prompted to consider the origin of the text and to critically evaluate the questions presented.

Is the information cited from a primary or secondary source? Are you being presented with facts or opinions?

Is there any evidence of a particular bias or agenda? What are your own views after having explored the issues?

CONTENTS

BRAINSTORM  50
WRITTEN ACTIVITIES  51
DISCUSSION ACTIVITIES  52
RESEARCH ACTIVITIES  53
DESIGN ACTIVITIES  54
MULTIPLE CHOICE  55-56
Brainstorm, individually or as a group, to find out what you know about marijuana and health.

1. What is cannabis, and what are some of the alternate names used?

2. What is synthetic cannabis, and what is its current legal status in Australia?

3. What do the letters THC represent when discussing marijuana, and what are its effects?

4. What is a cannabinoid, and what are some examples?
Complete the following activity on a separate sheet of paper if more space is required.

“We are at the dawn of a new age in medicine and a new day for mankind. Not only can hemp save the world, it can eliminate a great deal of human suffering and can even put an end to starvation. What are we waiting for?”

Rick Simpson (US cannabis oil campaigner)

Consider the above statement. Do you agree? Write a few paragraphs explaining how hemp differs from other varieties of cannabis, and the different ways it can be used. Address whether you are for or against the use of hemp and its associated products, and whether you feel it is, or is not, beneficial to society (include examples in your argument).
DISCUSSION ACTIVITIES

Complete the following activities on a separate sheet of paper if more space is required.

“Those who argue it [cannabis] should be legalised argue that it’s no more dangerous than alcohol. Those who don’t think it should be legalised point to evidence that it can cause lung damage, brain damage and psychosis.”

ABC Health & Wellbeing, Fact File: Cannabis

Read the above statement. Do you believe that cannabis should be legal or illegal in Australia? Form into groups of two or more people, and using the space provided below, compile a list of points with which to debate whether you agree or disagree with the proposition. Include examples of any positives and/or negatives to back up your arguments.

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Complete the following activity on a separate sheet of paper if more space is required.

“Medicinal cannabis will need to be a regulated substance available for use by people with designated medically approved conditions, with state legislation securing the oversight of use, marketing, production and manufacturing.”

Penington, D, Trials a step forward for medicinal cannabis but what comes next?

Use the internet to research places around the world that have approved the use of cannabis for medicinal purposes. Write a few paragraphs identifying the relevant countries or regions, the regulation status, how long their laws have been in place, and the medical conditions that cannabis may be used to treat. Also identify any countries or regions currently trialling the use of medicinal cannabis.
Complete the following activity on a separate sheet of paper if more space is required.

In groups of two or more, write a design brief for an educational flyer to explain the possible health effects of marijuana use and what can be done if you or a friend has a dependence issue. In the flyer offer some brief marijuana facts, symptoms of dependence, negative effects of use, and where you can find assistance (include text and images). Share your ideas with other groups in the class.
Complete the following multiple choice questionnaire by circling or matching your preferred responses. The answers are at the end of the next page.

1. Cannabis contains a wide variety of cannabinoids. Which of the following is the primary psychoactive substance in marijuana?
   a. Cannabidivarin (CBC)
   b. Cannabidiol (CBD)
   c. D9-tetrahydrocannabinol (THC)
   d. Cannabinol (CBN)
   e. Cannabigerol (CBG)
   f. Tetrahydrocannabivarin (THCV)

2. Which of the following are common symptoms of cannabis dependence? (select all that apply)
   a. Anxiety
   b. High productivity
   c. Restlessness
   d. Reduced appetite
   e. Mood swings
   f. Good concentration levels
   g. Irritability
   h. Insomnia
   i. Strange dreams

3. In which year was the Cannabis sativa plant outlawed in Australia?
   a. 1900
   b. 1918
   c. 1938
   d. 1963
   e. 1978
   f. 1983
   g. 2008
   h. 2015

4. In China, as early as 4000 BC, cannabis was used as a source for which of the following? (select all that apply)
   a. Fibre
   b. Cloth
   c. Wine
   d. Bowls
   e. Cooking oil
   f. Rope
   g. Bricks
   h. Food
5. Respond to the following statements by circling either 'True' or 'False':

a. In Australia, cannabis is a ‘prohibited poison’ unless used for medicine or research.  
   True / False

b. Canada became the first country in the world to approve medical cannabis nationwide in 2003.  
   True / False

c. There are only two psychoactive chemicals in cannabis.  
   True / False

d. In 2010, cannabis was the least commonly used illicit drug in Australia.  
   True / False

e. Synthetic cannabis is often made using powdered chemicals mixed with solvents which are then added to herbs.  
   True / False

f. Synthetic cannabis products have been marketed in Australia with product names such as Spice, Kronic, Lightning Red, and Godfather.  
   True / False

g. In India, cannabis has been used for the relief of anxiety by breaking the plant down and rubbing into the skin.  
   True / False

MULTIPLE CHOICE ANSWERS

1 = c ; 2 = a, c, d, e, g, h, i ; 3 = c ; 4 = a, b, e, f ; 5 – a = T, b = T, c = F (There are over 60 psychoactive chemicals in cannabis), d = F (In 2010, cannabis was the most commonly used illicit drug in Australia), e = T, f = T, g = F (In India, cannabis has been used in the relief of anxiety by ingesting the plant as food).
The predominant active chemical in cannabis is THC (delta-9-tetrahydrocannabinol); the flowering heads of the plant have higher THC levels than the leaves (ABC, Fact File: Cannabis). (p.1)

Young Australians (aged 14-24) first try cannabis at 16.7 years on average (AIHW, National Drug Strategy Household Survey). (p.3)

Synthetic cannabinoid use is illegal throughout Australia (NCPIC, Synthetic cannabinoids: Factsheet 25). (p.8)

In 2004-05, the estimated social costs of cannabis use (including health, crime, road crash and labour costs) was $3.1 billion. 90% of this cost was due to dependent cannabis use (AMA, Cannabis Use and Health 2014). (p.10)

Cannabis use during pregnancy has been consistently associated with lower birthweight babies and pre-term birth (ibid). (p.11)

Cannabis dependence is the most frequent type of substance dependence in Australia after alcohol and tobacco (ibid). (p.11)

Cannabis in recent street-level seizures in NSW has been shown to have a high potency, with around 15% THC, with little or no cannabidiol (ibid). (p.11)

Cannabis extracts and synthetic formulations have been licensed for medicinal use in some countries, including Canada, the USA, Great Britain and Germany, for the treatment of severe spasticity in Multiple sclerosis, nausea and vomiting due to cytotoxics, and loss of appetite and cachexia associated with AIDS (ibid). (p.12)

The possession, cultivation, use, and supply of cannabis is prohibited in all Australian states and territories. In some Australian jurisdictions there are criminal penalties for the possession, cultivation and use of cannabis, and in others there are less severe civil penalties (ibid). (p.13)

Around 30% of the Australian population have tried cannabis at some time. Among people under 35 years of age, around 50% had tried it at some time, and 28% had used it in the last year (SANE Australia, Cannabis and psychotic illness). (p.17)

People with a psychotic illness, such as schizophrenia, who use cannabis experience more hallucinations, delusions and other symptoms; they have a higher rate of hospitalisation for psychosis, and treatment is generally less effective and recovery more difficult (ibid). (p.17)

An AIHW report estimates that in 2010, of the population aged 14 years or over, 80.5% had used alcohol and 10.3% had used cannabis in the last 12 months (ABC, Is marijuana less dangerous than alcohol, as Barack Obama claims?). (p.23)

It has been estimated that there are at least 200,000 people dependent on cannabis in Australia. About 1 in 10 people who have tried cannabis at least once in their lifetime will become dependent on it (NCPIC, Cannabis and dependence: Factsheet 6). (p.25)

Prior to the development of modern science, cannabis was used as a medicine. It enjoyed a brief period of popularity as a medicinal herb in Europe and the US in the 1800s being prescribed for various conditions including menstrual cramps, asthma, cough, insomnia, birth labour, migraine, throat infection and withdrawal from opiate use (Copeland, J and Clement, N, The use of cannabis for medical purposes). (p.27)

Cannabis was removed from the register of medicines in the early twentieth century in the US and made illegal at around the same time (ibid). (p.27)

The earliest records date back to about 2700 BC when Chinese physicians were recommending a tea made from cannabis leaves to treat conditions like gout and malaria (Medicinal Cannabis Australia, The Origins of Cannabis). (p.34)

The ancient Assyrians made use of cannabis and it is specifically mentioned on clay tablets found at the library of Assurbanipal. It, along with another 400 other drugs, comprised the whole of the Assyrian pharmacopoeia of its day (ibid). (p.34)

We obtain the word cannabis from the Romans who obtained it from the Greek word Cannabasis, who in turn could have, and probably did, obtained it from the Assyrians. This would (if correct) make it one of the oldest words known to humans (ibid). (p.34)

In 1839, WB O’Shaughnessy wrote that he had found tincture of hemp to be an effective analgesic (ibid). (p.34)

In 1938, the plant Cannabis sativa was outlawed in Australia as a result of a reefer madness-style campaign in Australian newspapers, orchestrated by the US Bureau of Narcotics and its commissioner Harry J Anslinger. This campaign introduced the word ‘marijuana’ into Australia (ibid). (pp. 34-35)

In 1996, California, the first US state to ban cannabis use in 1915, became the first US state to then re-legalise medical cannabis use for people suffering from AIDS, cancer, and other serious illnesses (ibid). (p.35)

There are over 400 compounds in cannabis, including cannabinoids, terpenoids, and flavonoids (Medicinal Cannabis Australia, Why Medicinal Cannabis). (p.36)

Cannabinoids relieve symptoms of illness by attaching to receptors found throughout the body: in the brain, organs, connective tissues, glands and immune cells (ibid). (p.36)

There are 3 types of cannabinoids: herbal, which occur naturally only in the cannabis plant (phytocannabinoids); endogenous, produced naturally by humans and other animals (endocannabinoids); and synthetic, cannabinoids produced in a lab (ibid). (p.36)

The Therapeutic Goods Act sets a framework for drugs that states and territories adopt in their laws. Cannabis is a ‘prohibited poison’ unless used for medicine or research (Ries, N, From farm to pharmacy: regulating medicinal cannabis in Australia). (p.38)

Endocannabinoids help regulate many physiological processes: mood, memory, appetite, pain, immune function, metabolism and bone growth to name a few (there are even cannabinoid receptors in sperm (Allsop, DJ and McGregor, IS, Old dope, new tricks: the new science of medical cannabis). (p.47)
Acute pain
Pain which lasts for a short time, provoked by a specific disease or injury.

Cannabinoids
Substances that bind to biological receptors to produce the pharmacological effects demonstrated by cannabis, including both natural and synthetic cannabinoids.

Cannabis
Any plant in the genus *Cannabis* and any product derived from the plant, including dried cannabis (marijuana) and cannabis extracts. Includes the *Cannabis sativa*, *Cannabis indica* and *Cannabis ruderalis* types.

Cannabis extract
Any concentrated form of cannabis in which the chemical components of the cannabis plant have been extracted from the plant material, using a solvent or infusion method (includes cannabis oil and tinctures).

Cannabis oil
A liquid produced by infusing cannabis leaves and flowers in a solvent (such as an oil or an alcohol) to produce a concentrated extract, which can be thinned using oil. Sometimes known as ‘hash oil’.

Cannabis use disorder
Recurrent use of cannabis causing clinically and functionally significant impairment, such as health problems, disability and failure to meet responsibilities at work, school or home. Symptoms listed in the DSM-5 include disruptions in functioning, development of tolerance, cravings for cannabis and the development of withdrawal symptoms within a week of ceasing use.

Cannabidiol (CBD)
Non-psychoactive cannabinoid found in the cannabis plant.

Chronic pain
Pain which persists beyond the time of healing of surgery, trauma or other condition, frequently without a clearly identifiable cause.

Dependence
Dependence occurs when a drug is central to a person’s life, and they have trouble cutting down their use and experience symptoms of withdrawal when trying to cut down. Dependence can be physical and/or psychological. When a person’s body has adapted to a drug and is used to functioning with the drug present, the person is physically dependent upon that drug. When a person feels compelled to use a drug in order to function effectively or to achieve emotional satisfaction, the person is psychologically dependent.

Endocannabinoid
An endogenous substance that activates the same receptors as phytocannabinoids. Endocannabinoids are chemicals that occur naturally in the human body.

Hash
Also known as hashish. Cannabis resin which has been dried. Hash is often compressed into blocks.

Hemp
Varieties of cannabis which contain low levels of THC (generally 1% or lower by weight), and are commonly used to produce fibre (for use in cloth, rope and so on) or hemp oil.

Marijuana
Dried green-brown leaves or flowers of the cannabis plant. Marijuana is the most common form of cannabis and is smoked in hand-rolled cigarettes (joints) or in a pipe (a bong).

Medical cannabis
Cannabinoids as medicine utilise pharmaceutical preparations of THC and/or CBD. There have been no published human trials employing the accepted standard of a randomised controlled trial using smoked whole plant. The cannabinoid pharmaceutical preparations that have been developed have been used to treat a range of conditions such as chronic/acute pain, nausea, HIV and cancer-related wasting and spasticity associated with Multiple sclerosis.

Phytocannabinoid
Any plant-derived cannabinoid or plant-derived substance which interacts with the endocannabinoid system or is similar in structure to a cannabinoid.

Psychoactive
Affecting mental activity, behaviour or perception, such as a drug.

Psychosis
A mental and behavioural disorder causing gross distortion or disorganisation of a person’s mental capacity, affective response and capacity to recognise reality, communicate and relate to others. An anti-psychotic is a substance used to treat psychotic disorders.

Synthetic cannabinoid
Cannabinoids of synthetic origin, including compounds which are not chemically identical to, but mimic, the effect of cannabinoids found in the cannabis plant.

Tetrahydrocannabinol (THC)
Tetrahydrocannabinol, the principal psychoactive constituent (or cannabinoid) of the cannabis plant. An isomer of THC, delta-9-tetrahydrocannabinol, sometimes referred to as dronabinol, is believed to be the most active version of the compound. Tetrahydrocannabinolic acid (THCA) is the precursor chemical to THC. THCA is converted to THC as fresh cannabis dries, and when cannabis is subjected to heat, such as by smoking, baking or vapourisation. THCA lacks the psychoactive effects of THC but acts on the same receptors.

Tolerance
Occurs when the body becomes used to a drug being present and more of the drug is required in order to achieve the same effect felt previously with smaller amounts.

Withdrawal
Describes a set of symptoms that can occur when a user cuts down or stops the use of a particular drug. Symptoms can range from mild to severe, and are different depending upon which drug the user is withdrawing from.
WEB LINKS

Websites with further information on the topic

Australian Drug Foundation  www.adf.org.au
Australian Drug Information Network  www.adin.com.au
Australian Drug Law Reform Foundation  http://adlrf.org.au
Drug Aware  www.drugaware.com.au
Drug info @ your library  www.druginfo.sl.nsw.gov.au
DrugInfo  www.druginfo.adf.org.au
Family Drug Support Australia  www.fds.org.au
Medicinal Cannabis Australia  www.medicanaustralia.com.au
National Cannabis Prevention and Information Centre  http://ncpic.org.au
National Drug and Alcohol Research Centre  http://ndarc.med.unsw.edu.au
National Drugs Campaign  www.drugs.health.gov.au
Somazone  www.somazone.com.au
Turning Point  www.turningpoint.org.au

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Issues in Society | Volume 401

Marijuana and Health
INDEX

A
addiction see dependence
alcohol, harms compared to cannabis 1, 23-24
anxiety 3, 6, 11, 12, 21, 23, 30
AusCann 43
Australia
states and territories
Australian Capital Territory 5, 8
New South Wales 5, 8, 37, 39, 41, 47
Northern Territory 5, 8
Queensland 5, 8, 39, 41
South Australia 5, 8
Tasmania 5, 8
Victoria 5, 8, 37, 39, 41
Western Australia 5, 8

B
brain, effects on 17, 19-20, 21, 23, 36
bronchitis 2, 11, 24, 31

C
Canada 35
cancer 4, 12, 24, 27, 29, 31, 39, 41, 44
cannabidiol (CBD) 4, 20, 28, 29, 41, 48
cannabinoids 28, 36
potential benefits of 31
cannabis see marijuana, medicinal cannabis
Cannabis sativa 1, 10, 28, 41, 42
cancer chemotherapy 4, 40, 41
children
access to cannabis 11, 30
severe epilepsy, with 39, 41
cognitive impairment 2, 20, 30, 31

D
dependence 3, 11, 13-14, 25-26, 30
diagnosis 14-15
symptoms 26
treatment 3, 13-15, 26
depression 2-3, 11, 12, 21, 23, 30
doctors 14-15, 38, 44
driving 11, 30, 31
laws 45
drug tests 3-4

E
early intervention 14
edible cannabis products 30
endocannabinoids 28, 36, 46, 47
epilepsy 29, 39, 41, 44

G
gateway drug, cannabis as a 11-12
glaucoma 29

H
harm reduction 13, 15
harm see health/safety impacts
health/safety impacts, cannabis-related 2, 7, 9, 10, 14-15, 23-24, 30-31
public 10
HIV/AIDS 4, 27, 29, 39

L
laws
criminal penalties 5, 13, 15, 38
criminalisation of cannabis 34-35
enforcement 15
legislation, Australian 13
regulation 15
‘legal highs’ see synthetic cannabis
lung cancer 2, 11
problems 23, 30

M
marijuana use
effects of 1-2, 6-7, 10-11, 13, 17
prevention 14
recreational 15, 27, 40, 45
statistics
Australian population 3, 10, 17
young people 3
medicinal cannabis 27-48
benefits of 36
clinical trials 4, 15, 19, 27, 37, 39, 41, 42, 48
cultivation, legal 35, 37-38, 39, 43
decriminalisation of 19, 45
delivery of 30
hemp oil 46
history of 27, 34
legalisation of 35, 37-38, 39, 43
origin of 34-35
regulation 30, 37-38, 39-40, 41-42, 43, 44-45, 46, 47-48
Sativex (spray) 4, 12, 28, 37, 46, 48
supply chain 44-45
therapeutic value of 47-48
uses of 4, 12, 15
memory impairment 2, 11, 24, 25
mental health risks 2-3, 7, 12, 15, 21-22, 23, 25
psychological harms 31
psychosis 2, 6, 10, 12, 14, 15, 21-22, 41
psychotic illness 2, 17-18
research 15-16
schizophrenia 2, 12, 17, 21-22, 23, 24
mood swings 1-2, 12
Multiple sclerosis 4, 12, 29, 31, 44, 48

N
nabiximols 31, 37
Narcotics Drugs Act 1967 37, 40, 42
nausea 4, 27, 29, 40, 41
Netherlands, The 35
Norfolk Island 43, 47

P
pain relief 4, 12, 27, 29, 30, 31, 39, 41-42, 46, 48
paranoia 6, 12
Parkinson’s disease 12, 29
pregnancy 11

R
receptors 36
rehabilitation see dependence

S
Single Convention on Narcotic Drugs 1961 37, 40
smoking, cannabis 30
synthetic cannabis 6-9, 12-13, 15, 28, 36
brand names 6, 12
laws in Australia 8
packaging, misleading 7
regulating intake 7

T
terminal illnesses 37, 40, 41
THC (delta-9-tetrahydrocannabinol) 1, 3-4, 6, 10, 11, 17, 20, 21, 28, 29, 41, 42, 46, 47, 48
potency 11
Therapeutic Goods Act 1989 37, 38
Therapeutic Goods Administration 37
tobacco 24
tolerance 3, 11, 25 see also dependence
treatment see dependence

U
United States (USA) 27, 34, 35, 47

W
withdrawal, cannabis 7, 25, 29 see also dependence, tolerance

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