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The Relationship Between Cannabis Use and Psychosis

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Disclaimer

None of the authors of this presentation have any affiliations with any drug companies or any government policy boards.



Outline

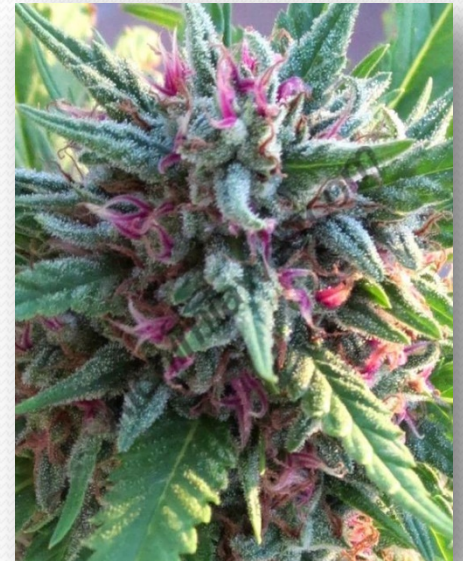
- Introduction
- Chemical properties of cannabis
- Problems associated with cannabis use
 - **Focus on Psychosis**
- Medical use of cannabis
- Mental Health and CBD
- Considerations for legalisation



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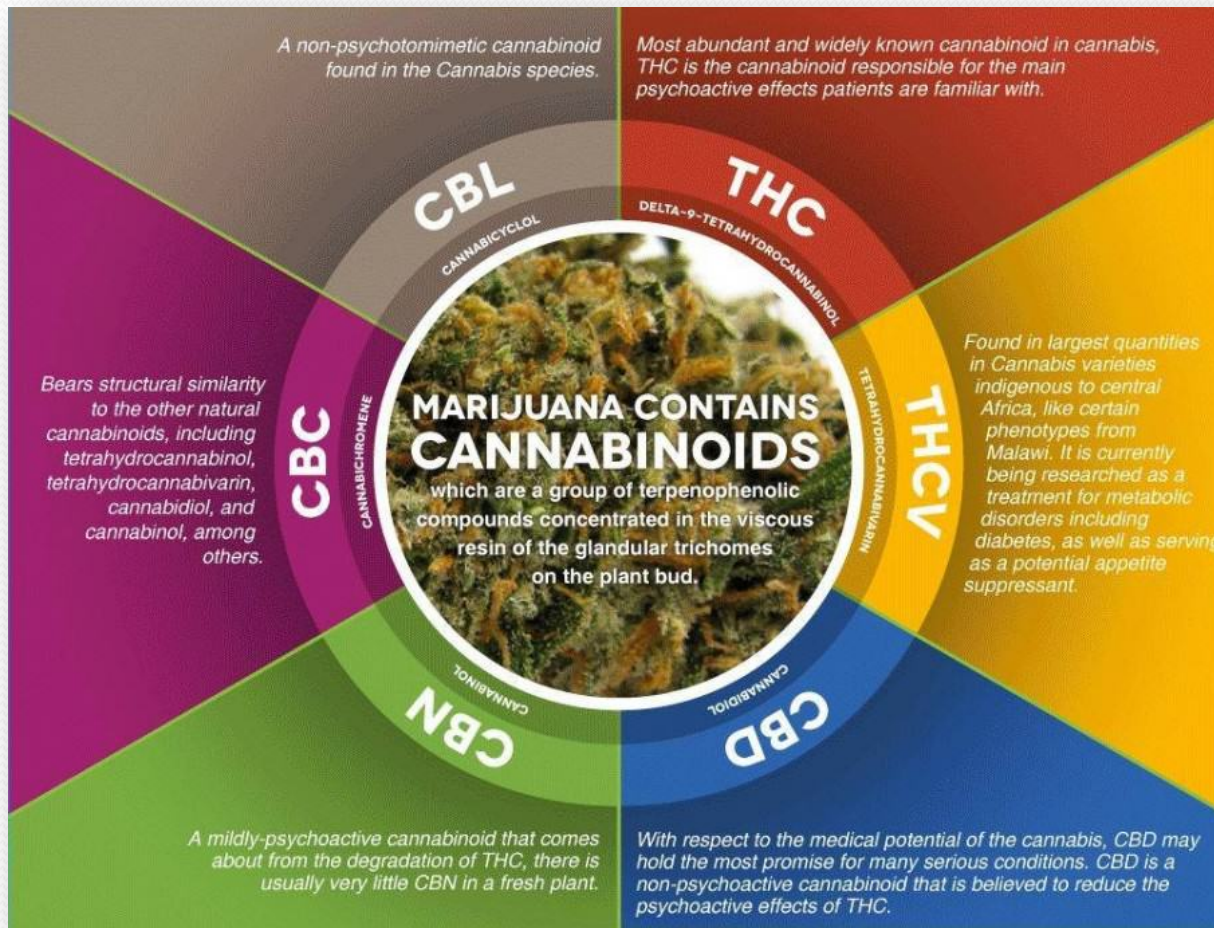
What is cannabis?

- (THC) 9-tetrahydrocannabinol (mind-altering, psychoactive ingredients)
 - Found in resin produced leaves and buds in female plant
- 500 other chemical compounds
- 100 compounds related to THC
 - Cannabinoids





What is cannabis?





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Introduction

Strain names

- Hybrid
 - Skunk ,White Widow, Big Bud



Skunk



White Widow



Big Bud

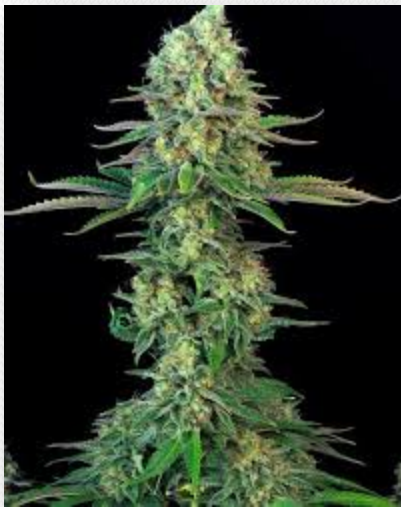


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Introduction

Strain names

- **Sativa**
 - Bubble gum, Sour Diesel, Holland's Hope



Bubble Gum



Sour Diesel



Holland's Hope

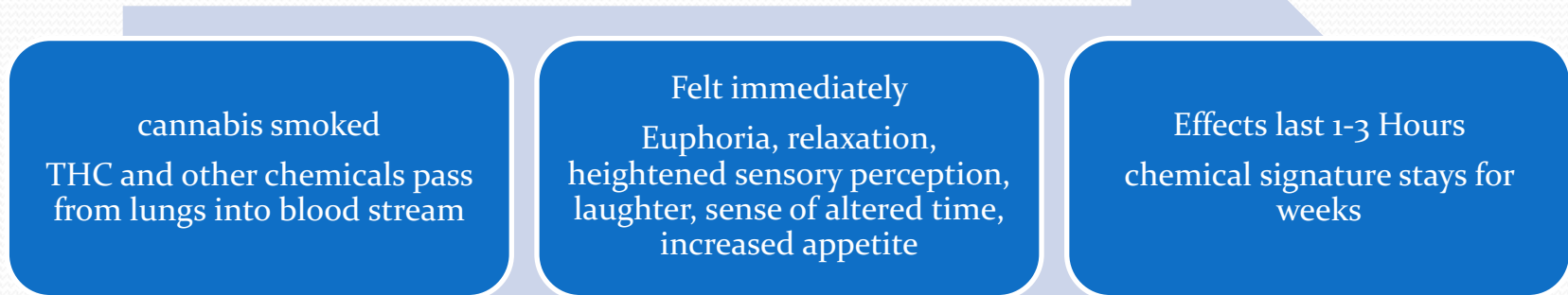


Historical Use of Cannabis

- Archeologists have found evidence of ancient cannabis use in Central Asia, China and other areas of the Far East.
- Uses:
 - Clothing, ropes, fishing nets, paper
 - Resin in medication preparations
 - To induce hallucinatory trances
- Recreational, pleasure



Effects of cannabis



- Edibles generally have slower onset (30 min) and longer duration
- Unpleasant reactions (anxiety, fear, distrust, panic), or acute psychosis
Common when person has taken too much, inexperienced, cannabis at high potency



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Cannabis' Effect on the Brain

Marijuana's Effects on the Brain

The diagram shows a lateral view of the human brain with several regions highlighted and labeled. Lines connect the labels to the corresponding parts of the brain.

- HYPOTHALAMUS**
Controls appetite, hormonal levels and sexual behavior
- BASAL GANGLIA**
Involved in motor control and planning, as well as the initiation and termination of action
- VENTRAL STRIATUM**
Involved in the prediction and feeling of reward
- AMYGDALA**
Responsible for anxiety, emotion and fear
- BRAIN STEM AND SPINAL CORD**
Important in the vomiting reflex and the sensation of pain
- NEOCORTEX**
Responsible for higher cognitive functions and the integration of sensory information
- HIPPOCAMPUS**
Important for memory and the learning of facts, sequences and places
- CEREBELLUM**
Center for motor control and coordination

© Alice Y. Chen, 2004. Adapted from *Scientific American*.

When marijuana is smoked, its active ingredient, THC, travels throughout the body, including the brain, to produce its many effects. THC attaches to sites called cannabinoid receptors on nerve cells in the brain, affecting the way those cells work. Cannabinoid receptors are abundant in parts of the brain that regulate movement, coordination, learning and memory, higher cognitive functions such as judgment, and pleasure.



Adverse Impact of Cannabis Use

Acute (intoxication)

- Impaired short-term memory
- Impaired attention, judgement, and other cognitive functions
- Impaired coordination and balance
- Psychiatric symptoms (anxiety, paranoia, psychosis)

Persistent (not permanent)

- Impaired learning and coordination
- Sleep problems

Long-term (cumulative)

- cannabis addiction
- Impairment in learning and memory (potential loss of 8 IQ points)
- Increased risk of chronic cough, bronchitis
- Increased risk for other drug or alcohol use disorders
- Increased risk of schizophrenia if genetic vulnerability



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Cannabis Potency Today

1990's
THC 3.8%

cannabis
potency
(from confiscated samples)

2014
THC 12.2%
(some samples
exceeding 80%)

Experienced users may adjust the amount they smoke and inhale based on potency

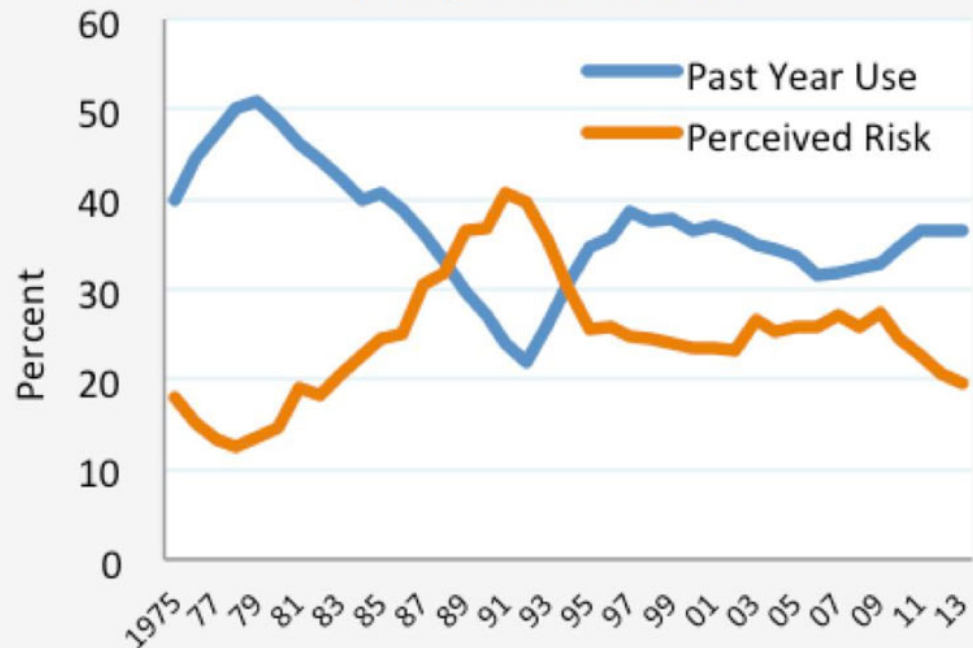


Misperceptions of Safety

As perception of risk decreases, use of cannabis increases.

Might legalization decrease the perception of risk and therefore increase cannabis use?

Marijuana Perceived Risk vs. Past Year Use by 12th Graders



SOURCE: University of Michigan, 2013 Monitoring the Future Study



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Associated Problems of Cannabis Use

Mental Health

Physical Health

Public Health



Problems associated with cannabis use: **Mental Health**

- Teen cannabis use associated with:
 - **Lower IQ & School Dropout**
 - 2012 Proceedings of the National Academy of Sciences found that long-term cannabis use started in teen years has a negative impact on intellectual functioning.
 - Increased dependence correlated with increased impairment.
 - Drop in IQ of 8 points in cannabis group as compared to control (never used cannabis)
 - Main areas of impairment in executive function and processing speed
 - Even after stopping cannabis, neuropsychological deficits were not recovered



Problems associated with cannabis use: **Mental Health**

- Teen cannabis use associated with:
 - **Lower IQ & School Dropout**
 - Evidence from neuro-imaging that brain activation to cognitive tasks continue to be abnormal even 3 weeks abstinent from cannabis.
 - Scans also showed hippocampus (memory) was 12% smaller and amygdala was 7% smaller (emotions and aggression) in men who were not heavy users.
 - Neurology, 2006 study found that those with 10+ years of heavy cannabis use had significantly greater deficits than those with 5-10 years of heavy use.



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Problems associated with cannabis use: **Mental Health**

Cannabis and Depression

- Depressed teens are 2x more likely to use cannabis than non-depressed teens.
- Teens who use cannabis are more likely to have suicidal thoughts than non users.





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Cannabis Use and Psychosis

1. **Direct causality**
2. **Gene-environment interaction**
3. Shared etiology
4. Self medication of premorbid symptoms



Problems associated with cannabis use: **Mental Health**

Cannabis and Psychosis

- In a 2004 lab study, it was found that cannabis induced a range of schizophrenia-like effects in healthy controls.
- Study from University of New South Wales found that individuals who later developed schizophrenia tended to exhibit symptoms 2.7 years earlier than those who did not use cannabis
- Risk of developing schizophrenia increases from less than 1% to 5% when also using cannabis.
 - Unclear evidence of causation but clear that cannabis plays a significant role in psychosis.



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Cannabis and Psychosis

- Study found tetrahydrocannabinol use resulted in acute and transient psychosis (positive and negative symptoms).
 - *Severity of symptoms were dose dependent*
- Age of onset of cannabis use correlated with age of onset for psychosis.
- Heavy cannabis use show reduced volumes in the amygdala and hippocampus (similar to patients with schizophrenia)
 - *exaggerated symptoms in those with schizophrenia who use cannabis*

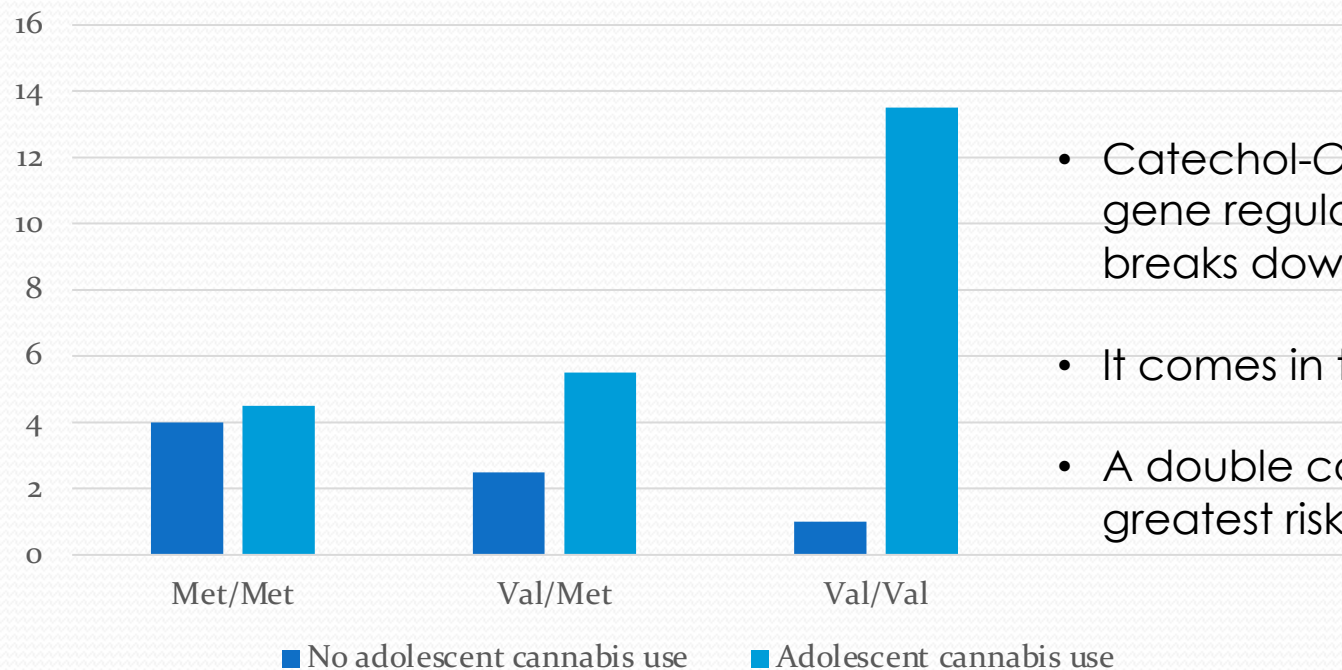


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Genetic Vulnerabilities

The Influence of Adolescent cannabis Use on Adult Psychosis Is Affected by Genetic Variables

Percentage of Individuals Meeting Diagnostic Criteria for Schizophreniform Disorder at Age 26



- Catechol-O-methyltransferase gene regulates an enzyme that breaks down dopamine
- It comes in two forms (Met & Val)
- A double copy of Val poses greatest risk

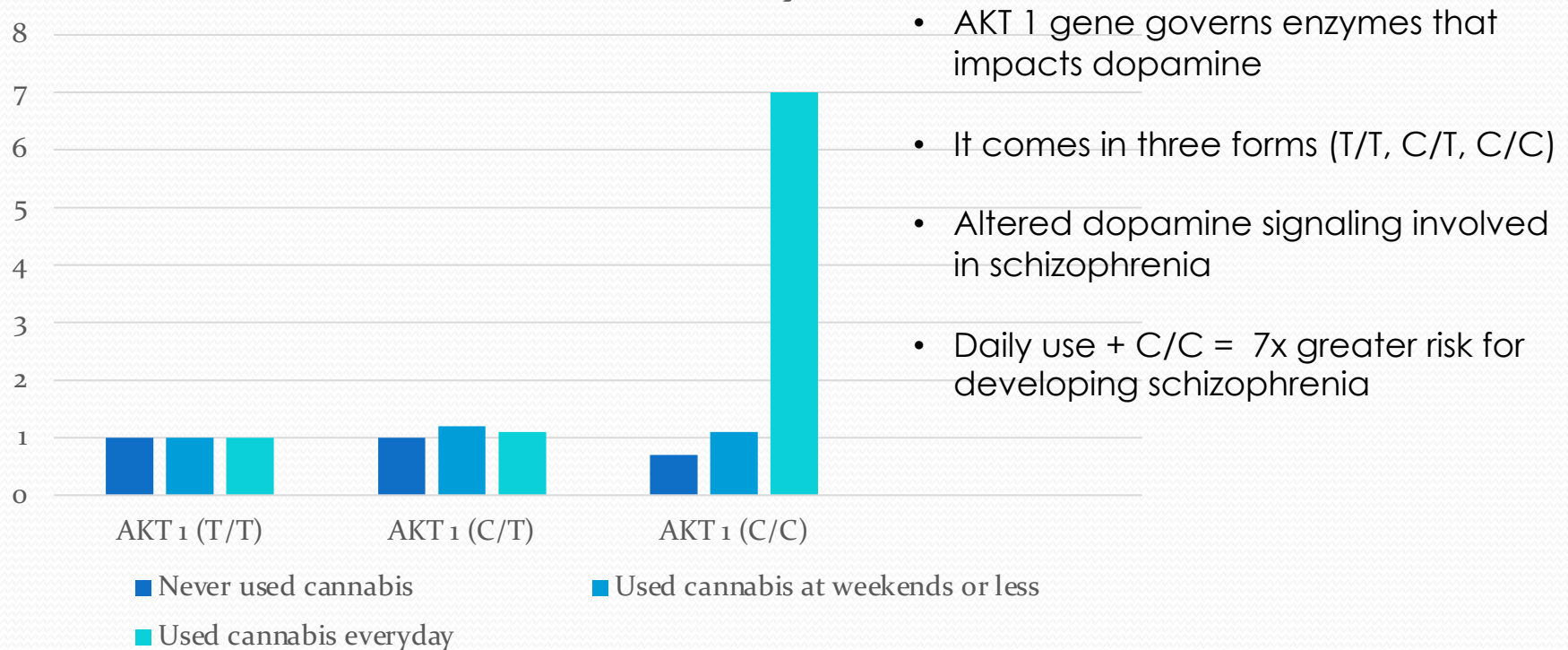


Genetic Vulnerabilities

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The Influence of Adolescent cannabis Use on Adult Psychosis Is Affected by Genetic Variables

AKT Gene Variations and Psychosis





Cannabis and Medical Health

Lungs

- Airway inflammation
- Coughing, chronic bronchitis
- Increased risk of lung cancers (mixed results)
- (antitumor effects?) cannabis vs. Cigs

Heart

- Generally increased heart rate, breathing passages enlarge (20-50 beats extra per min)
- Risk of heart attack in 1 hour of smoking, 5x
- Increased blood pressure, reduced ability of blood to carry oxygen (orthostatic hypotension)

Cancer

- cannabis use in adolescence and aggressive testicular cancer (nonseminomatous testicular germ cell tumor)



Problems associated with cannabis use: **Physical Health**

- In the US, ER visits increased by 19% from 2009-2011
- On an average day in 2010, 266 cannabis related ER visits in youths (ages 12-17).
- cannabis use increases risk of use of other substances
 - In twin study, twin using cannabis 4x more likely than non-cannabis using twin to use cocaine, crack and other substances
 - In another study, of adults (26 years or older), 62% indicated that they initiated cannabis use before age 15 as their first substance. Less than 1% who never tried cannabis went on to use cocaine.



Problems associated with cannabis use: **Public Health**

The cost of treatment

- Between 1998-2008 admission to treatment centers for alcohol use decreased, cannabis admissions increased by 30% in USA.
- In California, 117% increase in admissions for cannabis abuse.
- 40% of admissions in 2011 were for primary cannabis use in individuals under 20.
- Significant strain on health care systems



Problems associated with cannabis use: **Public Health**

Crime

- **White House Office of National Drug Control (2007)**
 - Teenage drug use associated with violent and delinquent behaviour. Also indication of crime in later life.
 - Increases in physically attacking people, stealing property, destroying property
- **63.9% of students in 2005/2006 who carried a gun to school reported using cannabis**
- **According to Bureau of Justice Statistics (2006) 12.7 percent of state prisoners and 12.4% of federal prisoners are serving time for cannabis related crime.**



Problems associated with cannabis use: **Public Health**

Drugged driving

- Under influence of cannabis, poor motor skills, impaired reaction time, impaired judgment.
- 2000 study found driving under influence of cannabis greater accident risk than alcohol. Cannabis - 19% risk of accident; Alcohol - 13% risk of accident
- Steady increase in incidence of drug use associated with car accidents and more so with fatal car accidents



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Medication Using Cannabis Derivatives

The US FDA / Bermuda has approved THC-based medications
(chemically derived pills, liquids, sprays)

Drug	FDA Approved for:
Marinol (dronabinol)	<ul style="list-style-type: none">✓ Nausea in patients undergoing chemotherapy✓ Stipulate appetite in wasting syndrome (AIDS)
Cesamet (nabilone)	<ul style="list-style-type: none">✓ Nausea in patients undergoing chemotherapy✓ Stipulate appetite in wasting syndrome (AIDS)
Epidiolex (CBD-based liquid medication)	<ul style="list-style-type: none">✓ Dravet syndrome (severe childhood epilepsy)✓ Lennox-Gastaut syndrome (severe childhood epilepsy)
Sativex (Nabiximols, Mouthspray)	<ul style="list-style-type: none">✓ Spasticity and neuropathic pain in multiple sclerosis



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Mental Health Considerations When Utilising Cannabis- based Medications and Supplements



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Mental Health consideration in using cannabis-based medications and supplements

- Cannabis products should not be used by anyone under 25-years unless no other viable medical option is available.
- Other indications against use:
 - A personal history or strong family history of psychosis
 - A current or past cannabis use disorder or active substance use disorder
 - Cardiovascular (angina, peripheral vascular disease, cerebrovascular disease, arrhythmia)
 - Respiratory disease
 - Pregnancy or planning to become pregnant or breastfeeding



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Children & Adolescents

When prescribing for children and adolescents you must consider:

- Potential impact on psychological, emotional and cognitive development
- Potential sedative effects
- Potential impact on structural and functional brain development.



Legally: US

- Federally, cannabis remains listed as a Schedule I substance.
- Schedule I substances are classified as having a high potential for abuse, no currently accepted medical use in treatment and a lack of accepted safety for use under medical supervision.
- Schedule III drugs are classified as having less potential for abuse than other drugs and have currently accepted medical use.



Legally: US

- Currently, 30 U.S. states have some form of relaxed cannabis regulation. Two states (Colorado and Washington) have legalised cannabis sales with associated state taxes.
- Post legalisation several challenges have been identified.



Legally: BDA

Misuse of Drugs Amendment Act December 2017

- Cannabis remains a controlled drug (Misuse of Drugs Act 1972)
- The 2017 amendment does NOT:
 - **remove criminal offences for the simple possession of 7 grams or less of cannabis**
 - **Erase prior criminal convictions for cannabis**
 - **Provide guarantee that an individual will not be stopped when attempting to travel to US**
- It remains illegal to smoke cannabis in public or private places
- Possession of more than 7 grams may result in arrest and prosecution and criminal conviction
- Possession of less than 7 grams may result in search of car, home, boat and may result in prosecution if other offenses are found or suspected.



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Cannabis and Psychosis Summary

- Overall 2-7x increased risk of developing psychosis with adolescent and young adult cannabis use.
- Risk appears to increase with:
 - Increased use of cannabis
 - Higher potency THC cannabis use
 - Presence of relevant genetic vulnerabilities
- Adult cannabis use presents risk of transient and dose dependent psychosis and worsening mental health problems
- CBD based products have several contraindications including current or past mental health diagnoses



Psychosis Risks & Legalisation

- Legalisation of recreational cannabis use must take into account associated mental health risks
- Suggestions if cannabis is legalised:
 - Establish education programs
 - Encourage avoidance of cannabis use in higher risk groups
 - Increase access to prevention programs
 - Increase access to treatment in the young adult and adolescent populations



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