The Problems with Today's High Potency THC from the Perspective of an Addiction Psychiatrist – Following the Science

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Presentation for the Illinois Association of Problem-Solving Courts (ILAPSC) Annual Conference

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Disclosures

- I have no financial relationship with any pharmaceutical company, or any part of the alcohol, tobacco or marijuana industries
- I am on the speaker's bureau for the National Marijuana Initiative of HIDTA www.thenmi.org
- I am on the board of IASIC – International Academy on the Science and Impacts of Cannabis www.IASIC1.org

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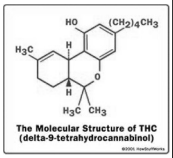
Cannabis

- Complex alkaloid mixture of more than 400 compounds
- At least 60 different compounds described with activity on the cannabinergic system in the body
- Most abundant cannabinoids are
  - Delta-9 tetrahydrocannabinol (most psychoactive) - THC
  - Cannabidiol - CBD
  - Cannabinol
- Effect first discovered in 1963 by Raphael Mechoulam in Israel – he injected THC into aggressive rhesus monkeys – they became calm and sedated



The Molecular Structure of THC (delta-9-tetrahydrocannabinol)

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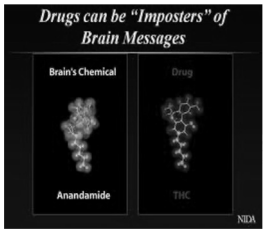
Cannabinergic system

Two main cannabis receptors:

- CB1–present throughout CNS
  - Hippocampus
  - Cortex
  - Olfactory areas
  - Basal ganglia
  - Cerebellum
  - Spinal cord
- CB2 – located peripherally, linked with immune system
  - Spleen
  - Macrophages



Anandamides discovered in 1992 – Sanskrit word for "supreme joy

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Endocannabinoid Receptors

- This is our mood regulatory system – CB1 receptors are for anandamides - "supreme joy"
- (negative feedback to neurotransmission receptor)
- CB1 receptors regulate the balance between excitatory and inhibitory neuronal activity to achieve homeostasis
- Exposure to cannabis during adolescence disrupts glutamate which plays an important role in synaptic pruning in PFC – disrupting normal brain development

Lubman et al. Cannabis and adolescent brain development. Pharmacology and Therapeutics 2015;148:1-16

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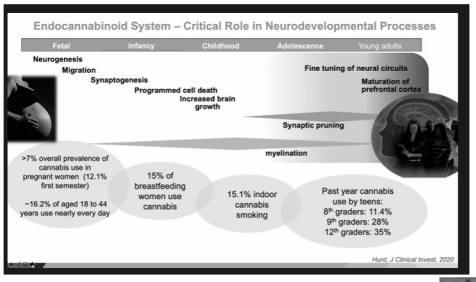

Transgenerational Effects of early cannabis exposure on the developing brain and behavior

Institute of Cannabis Research – CSU-Pueblo Webinar Series – February 10, 2022
Cannabis Research Webinar Series | Monthly Webinars | CSU-Pueblo (csupueblo.edu)

Yasmin Hurd
Director, Addiction Institute of Mount Sinai
Icahn School of Medicine at Mount Sinai
Depts Psychiatry, Neuroscience and Pharmacological Sciences

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Commercialization has radically changed marijuana

THEN

Before 2000, THC Potency in Marijuana was 4-5%

NOW

Today, THC potency in products like shatter can exceed 90%.

They are smoked in a rig using a butane torch.

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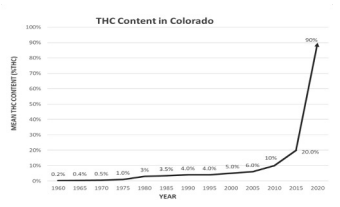
MASSIVE INCREASE IN THC POTENCY IN COLORADO



Mahmoud A. Elsohly (2014) Potency Monitoring Program, Supported by NIDA (years 1960-2015), and Colorado Department of Health and Environment, *THC Concentration in Colorado Marijuana* (year 2020)

- Research supporting the use of dispensary cannabis for medical purposes is on THC less than 10%
- We have no research that shows high potency products are safe or effective for any medical condition
- Multiple studies show serious problems with high THC: addiction, psychosis, depression, anxiety, sleep problems, suicide, violence.

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"Medical Marijuana" the Trojan Horse

- Every state starts with "medical marijuana"
- Terminology is important
- Cannabinoid-Based Medication
  - Registered medicinal cannabis extracts with defined and standardized THC and THC/CBD content should be classified as 'cannabis-derived' or 'cannabis-based' medicines
  - Examples: Epidiolex®, Sativex®,(natural); dronabinol (semi-synthetic); nabilone
- Medical Cannabis
  - Cannabis plants and plant material, flowers, marijuana, hashish, buds, leaves, or full plant extracts used for medical reasons
  - Poorly regulated and poorly tested for contaminants

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HOUSE BILL 16-1359 - CONCERNING THE USE OF MEDICAL MARIJUANA WHILE ON PROBATION.

- When granting probation, the court may, as a condition of probation, require that the defendant: (VIII) Refrain from excessive use of alcohol or any unlawful use of controlled substances, as defined in section 18-18-1 02 (5), or of any other dangerous or abusable drug without a prescription; except that the court shall not, as a condition of probation, prohibit the possession or use of medical marijuana, as authorized pursuant to section 14 of article XVIII of the state constitution, unless:
- (A) The defendant is sentenced to probation for conviction of a crime under article 43.3 o title 12, C.R.S.; or
- (B) The court determines, based on the assessment as required by section 18-1.3-209 ANY MATERIAL EVIDENCE, THAT a prohibition against the possession or use of medical marijuana is necessary and appropriate to accomplish the goals of sentencing as stated in SECTION 18-1-1 02.5;

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My Experience with CUD in a 90-day Inpatient Co-occurring Treatment Program in Colorado

Year	N	%Completion of Program	% Reporting Use of Cannabis	% Reporting Tobacco Use
2014	66/83	80%	73%	88%
2015	62/86	72%	80%	89%
2016	56/85	66%	89%	89%
2019	37/70	53%	95%	91%

The numbers with cannabis use disorder as their **primary** drug problem increased significantly over last 5 years

2015 – 4%

2016 – 9%

2019 – 14%

Seeing increasing cognitive problems, psychotic symptoms, fixed delusions, cannabinoid hyperemesis syndrome, problems with violence in those using high potency THC marijuana

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Research supporting the use of smoked cannabis for medical conditions is limited to less than10% THC

- All studies of smoked medicinal cannabis showing benefit – done with less than 10% THC
  Whiting PF, Wolff RF, Deshpande S et al. Cannabinoids for medical use a systematic review and meta-analysis. JAMA 2015;313:2456-2473
- No legitimate science exists to validate medicinal cannabis greater than 10% THC
- A study in healthy volunteers on cannabis effects in capsaicin-induced pain found a window of modest analgesia for smoked cannabis. Wallace M et al. Anesthesiology 2007;107:785-796
  - 2% THC provided no benefit
  - 4% THC provided significant pain decrease
  - 8% THC caused increased pain or hyperalgesia

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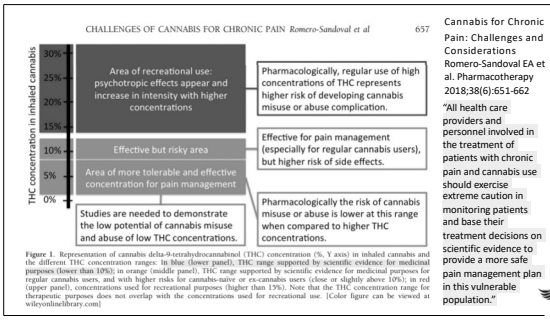

Figure 1. Representation of cannabis delta-9-tetrahydrocannabinol (THC) concentration (%, Y axis) in inhaled cannabis and the different THC concentration ranges: In blue (lower panel), THC range supported by scientific evidence for medicinal purposes (lower than 10%); in orange (middle panel), THC range supported by scientific evidence for medicinal purposes for regular cannabis users, and with higher risks for cannabis-naïve or ex-cannabis users (close or slightly above 10%); in red (upper panel), concentrations used for recreational purposes (higher than 15%). Note that the THC concentration range for therapeutic purposes does not overlap with the concentrations used for recreational use. [Color figure can be viewed at wileyonlinelibrary.com]

Cannabis for Chronic Pain: Challenges and Considerations Romero-Sandoval EA et al. Pharmacotherapy 2018;38(6):651-662

"All health care providers and personnel involved in the treatment of patients with chronic pain and cannabis use should exercise extreme caution in monitoring patients and base their treatment decisions on scientific evidence to provide a more safe pain management plan in this vulnerable population."

THC range supported by scientific evidence for medicinal purposes is lower than 10% (Blue panel above)

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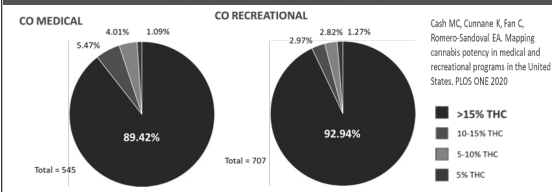
MOST PRODUCTS AVAILABLE IN COLORADO MEDICAL AND RECREATIONAL DISPENSARIES CONTAIN GREATER THAN 15% THC



Cash MC, Cunnane K, Fan C, Romero-Sandoval EA. Mapping cannabis potency in medical and recreational programs in the United States. PLOS ONE 2020

- Prior to HB21- 1317 twice as much could be bought daily in medical versus retail (40 grams vs 20 grams per day), taxes significantly lower, no marijuana recommendation specifications or monitoring

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Comparing FDA approved cannabinoids with dispensary concentrates from a THC dose perspective

- FDA approved drug - pure THC - dronabinol (Marinol) recommended max dose 20 mg per day
- Nabiximols (Sativex) each spray contains 2.7 mg THC and 2.5 mg CBD. Maximum dose – 48 sprays/24 hrs – 130 mg THC per day
- One gram shatter bag with 80% THC = 800 mg THC per bag (even with just 25% bioavailability via smoking = 200 mg THC)
- In Colorado, 18–20-year-olds can purchase 2 grams per day with a medical card (1600 mg THC), Adults can purchase – 8 grams per day (6,400 mg THC) (Prior to HB21-1317 all could purchase 40 grams per day)
- This is **not medicine**
- "THIS MUCH THC IS NOT MEDICINAL" COLORADO'S THC PURCHASING LIMITS BEFORE AND AFTER HB21-1317 - YouTube

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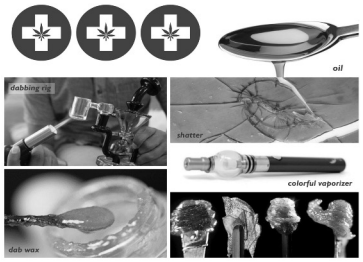
KIDS AND ADULTS THINK IT'S SAFE BECAUSE IT IS AGGRESSIVELY MARKETED AND SOLD AS MEDICINE



The use of e-cigarettes and vape devices by youth has rapidly increased, driven in part by marketing and advertising

JAMA Pediatrics 2019;143(6):e20182741

Among adolescents reporting use of vape products in Colorado, 50.1% reported using marijuana in the past 30 days versus 7.6% of those not using vape products.

NEJM 2019;380:689-690

There has been a significant increase in dabbing and edible use among adolescents in Colorado since 2015.

JAMA Pediatrics 2019;173:988-989
Colorado Healthy Kids Survey, 2019

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Cannabis legalization in Colorado has resulted in increasing cannabis use by pregnant women

- Cannabis legalization and cannabis-involved pregnancy hospitalizations in Colorado Wang GS et al. Preventive Medicine 156 (2022) 106993
- In Colorado, there was more than a two-fold increase in cannabis involved pregnancy hospitalizations between 2011 and 2018.
- This increase was highest after sale of recreational cannabis began in 2014.
- Counties with no baseline exposure to medical cannabis had a greater increase than other counties suggesting the presence of the recreational market may influence cannabis use decisions among pregnant individuals.
- There are concerns of the impact of cannabis use on the maternal-infant dyad, and specifically on the neurodevelopment of the child.
- Need for tighter regulations and public education to limit use during pregnancy and resources to support cannabis cessation in this population.

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Why is this important?

- Prenatal cannabis use increases the likelihood of
  - preterm birth
  - low birth weight
  - small-for gestational age
  - major congenital anomalies
  - prenatally exposed female infants showing evidence of increased susceptibility
  - Additional measures are needed to inform the public and providers of the inherent risks of cannabis exposure in pregnancy

Luke S et al. Cannabis use in pregnancy and maternal and infant outcomes: A Canadian cross jurisdictional population-based cohort study PLOS ONE November 2022

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IQ and Brain Development Studies

- Prospective study of 648 children and exposure to cannabis in-utero
- Women interviewed about the amount and frequency of marijuana use at 4 and 7 months of pregnancy and delivery
- Children assessed with IQ test at age 6
- Examiners blinded to exposure
- In Utero exposure (light to moderate marijuana users, approx. 3x/week) has a significant negative effect on school-age intellectual development
- Goldschmidt L et al. J Am Acad Child Adolesc Psychiatry, 2008.

19

Maternal cannabis use in pregnancy and child neurodevelopmental outcomes Corsi DJ et al. Nature Medicine 2020

- retrospective analysis of all live births in Ontario, Canada, between 1 April 2007 and 31 March 2012.
- Association between maternal cannabis use in pregnancy and the incidence of autism spectrum disorder in the offspring.
- The incidence of autism spectrum disorder diagnosis was
  - 4.00 per 1,000 person-years among children with exposure
  - 2.42 per 1,000 among unexposed children
- The incidence of intellectual disability and learning disorders was higher among offspring of mothers who use cannabis in pregnancy, although less statistically robust

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Associations Between Prenatal Cannabis Exposure and Childhood Outcomes Results From the ABCD Study

Paul SE et al. JAMA Psychiatry 2020

- cross-sectional analysis of 11,489 children (655 exposed to cannabis prenatally)
- prenatal cannabis exposure after maternal knowledge of pregnancy was associated with greater psychopathology during middle childhood, even after accounting for potentially confounding variables.
- Prenatal cannabis exposure may increase risk for psychopathology
- consistent with recent recommendations by the Surgeon General of the United States, these data suggest that cannabis use during pregnancy should be discouraged by clinicians and dispensaries.

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Association of Mental Health Burden With Prenatal Cannabis Exposure From Childhood to Early Adolescence: Longitudinal Findings From the Adolescent Brain Cognitive Development (ABCD) Study

- Baranger DAA et al. Research Letter JAMA Pediatrics September 2022
- PCE is associated with persisting vulnerability to broad-spectrum psychopathology as children progress through early adolescence. Increased psychopathology may lead to greater risk for psychiatric disorders and problematic substance use as children enter peak periods of vulnerability in later adolescence.
- Most significant differences between those exposed and those not exposed
  - Conduct disorder
  - Aggressive behavior/rule breaking

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Maternal cannabis use is associated with suppression of immune gene networks in placenta and increased anxiety phenotypes in offspring

- Rompala G, Nomura Y, Hurd YL PNAS 2021;118(47) e2106115118
- mCB was associated with increased anxiety, aggression, and hyperactivity in offspring
- Increased hair cortisol levels
- Reduction in normalized HRV
- Reduced immune-related gene expression in placenta
- Reduced proinflammatory cytokines and immune cell-type markers
- These significantly correlated with anxiety problems and hyperactivity

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Association of Comorbid Behavioral and Medical Conditions With Cannabis Use Disorder in Pregnancy

MeinhoferA et al. JAMA Psychiatry. doi:10.1001/jamapsychiatry.2021.3193

- Cross-sectional study of 20,914,591 female individuals in 35 US states
- Proportion of prenatal hospitalizations involving CUD increased substantially between 2010 and 2018.
- 249,084 (1.19%) involved CUD and 20,665,507 (98.81%) did not.
- Proportion of prenatal hospitalizations involving CUD increased from 0.008 in 2010 to 0.02 in 2018.
- There was a higher prevalence of depression, anxiety, and nausea disorders in prenatal hospitalizations with CUD compared with those without CUD, regardless of concomitant substance use disorders.

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Recommendations From Cannabis Dispensaries About First-Trimester Cannabis Use Dickson B et al. Obstet Gynecol 2018;131:1031–8)

- Phone script - caller stated she was 8 weeks pregnant and experiencing morning sickness - "Are there any products that are recommended for morning sickness?"
- 400 dispensaries contacted in Colorado
- Nearly 70% of Colorado cannabis dispensaries contacted recommended cannabis products to treat nausea in the first trimester.
- Few dispensaries encouraged discussion with a health care provider without prompting.
- Example: "Technically, with you being pregnant, I do not think you are supposed to be consuming that, but if I were to suggest something, I suggest something high in THC."
- Bud Tenders Practicing Medicine without a License

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Accessibility of Cannabis Dispensaries and Decreased perception of Harms increases use of cannabis by pregnant women in California

- 99,127 pregnancies were screened for prenatal cannabis use via urine toxicology testing before (January 2019 to March 2020) and during (April 2020 to December 2020) the COVID-19 pandemic. Larger absolute increases in prenatal cannabis use were associated with living within vs more than a 10-minute drive of a cannabis retailer.
- Young-Wolff KC et al. Geographic Accessibility of Retail Cannabis in Northern California and Prenatal Cannabis Use During the COVID-19 Pandemic JAMA Network Open. 2022;5(11):e2244086. doi:10.1001/
- Qualitative study of 53 pregnant individuals who used cannabis found consistent beliefs that legalization led to easier cannabis access (via retailers and delivery), greater acceptance (including reduced stigma, more patient-clinician discussions about prenatal cannabis use, and fewer concerns about Child Protective Services involvement), and trust in cannabis retailers (including safety and effectiveness of diverse products sold and perceptions of employees as knowledgeable, nonjudgmental, and caring).
- Young-Wolff KC et al. Perceptions About Cannabis Following Legalization Among Pregnant Individuals With Prenatal Cannabis Use in CaliforniaJ AMA Network Open. 2022;5(12):e2246912. doi:10.1001/

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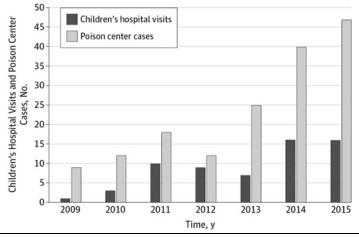
Colorado Pediatric Marijuana Exposures in Children 9 and younger Wang GS et al. *JAMA Pediatr.* 2016;170(9)



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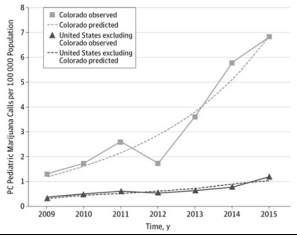
Colorado Pediatric Marijuana Exposures vs US Pediatric Exposures Wang GS et al. *JAMA Pediatr.* 2016;170(9)



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Pediatric Edible Cannabis Exposures and Acute Toxicity: 2017–2021

Tweet MS, Nemanich A, Wahl M. PEDIATRICS Volume 151, number 2, February 2023:e2022057761

- retrospective analysis of the National Poison Data System data for pediatric exposures to edible cannabis products in children < 6 years of age
- 2017 - 207 reported cases
- 2021 - 3054 cases, an increase of 1375.0%
- 70% of cases followed to a known outcome were reported to have central nervous system depression.
- Of all reported cases, 22.7% of patients were admitted to the hospital.
- Unlike with tobacco or alcohol products, there are no nationwide laws regarding how cannabis products are packaged. Products continue to be offered in brightly colored, enticing packaging that is identical in style to how candy and snack products are marketed.

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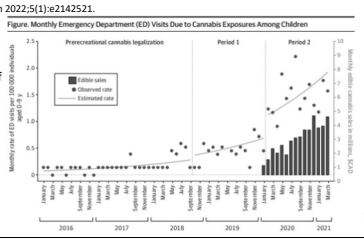
Unintentional Pediatric Cannabis Exposures After Legalization of Recreational Cannabis in Canada

Myran DT et al. JAMA Network Open 2022;5(1):e2142521.

800 % increase in cannabis poisonings among children in Ontario after the legalization of recreational cannabis. Increases in ED visit frequency and severity occurred despite strict regulations that largely exceed US regulations (eg, a maximum of 10 mg of THC per entire edible package, child-resistant packaging, and marketing restrictions)

Figure. Monthly Emergency Department (ED) Visits Due to Cannabis Exposures Among Children



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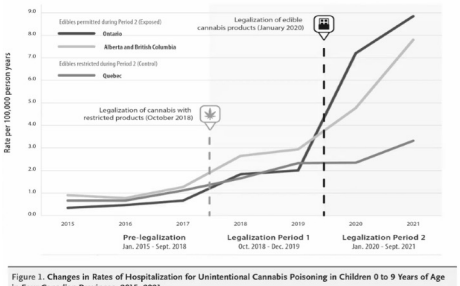

Figure 1. **Changes in Rates of Hospitalization for Unintentional Cannabis Poisoning in Children 0 to 9 Years of Age in Four Canadian Provinces, 2015–2021.**

Total of 581 hospitalization during study

Change in hospitalizations due to cannabis poisonings

All 2.6 increase (95%CI 2.0 – 3.4) P1 vs pre-legal

Exposed further 2.9 increase (95% CI 2.2 – 3.7) P2 vs P1

Control no significant change P2 vs P1 (IRR 1.18 95%CI 0.7 – 1.9)

N Engl J Med 2022; 387:757-759
DOI: 10.1056/NEJMc2207661

2022

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Effects of increasing cannabis potency on adolescent health

Wilson J, Freeman TP, Mackie CJ www.thelancet.com/child-adolescent Vol 3 February 2019

- Problematic cannabis use typically peaks in adolescence— an age group that could be particularly vulnerable to its harmful effects
- Cannabis markets are dominated by high-potency cannabis (high in Δ-9-tetrahydrocannabinol [THC] and low in cannabidiol), with THC content steadily increasing worldwide
- Compared with low-potency cannabis, high-potency cannabis appears to be associated with a greater risk of psychotic symptoms, depression, anxiety, and cannabis dependence
- Adolescents only partially titrate their use of high-potency cannabis, which can result in the consumption of high concentrations of THC
- Alongside more accurate measures of cannabis potency, further research must adopt longitudinal, cognitive, and neuroimaging measures to gain a better understanding of the health effects of cannabis use in adolescence
- With cannabis policy rapidly changing, up-to-date evidence should inform decisions on potency taxes or potency thresholds, as well as define the legal age of purchase

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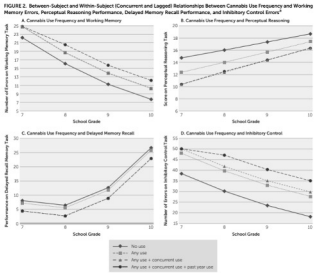
Cannabis May Be Worse for Teen Brains Than Alcohol

Evaluated 3,826 teens starting from seventh grade from 31 Montreal-area schools over the course of four years

teens who used cannabis more often than others had cognitive function changes that appeared "to be more pronounced than those observed for alcohol."

Morin JFG et al. Am J Psychiatry 2019; 176:98–106



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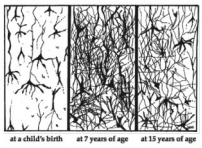
Cognitive issues worsened by early cannabis use, when the brain is still developing (up to age 25)

Both the Nicotinic Cholinergic and the Cannabinoid CB1 receptors play a significant role in pruning during brain development in adolescence

Synaptic Pruning



The next change after this synaptic growth spurt is a selective pruning which takes place.

In adolescence, most of this pruning is taking place in the frontal lobes.

The adolescent loses approximately 3 percent of the gray matter in the frontal lobes.

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Receptor binding in brain tissue

Compound	Potency relative to THC
(-)-Delta9-THC	1
Anandamide	.47*

*The affinity of anandamide for cannabinoid receptors ranges from about one-fourth to one-half that of THC. The differences depend on the cells or tissue that are tested and on the experimental conditions, such as the binding assay used.

Source: Joy J, Watson SJ, Benson JJ, eds. Cannabinoids and animal physiology. In: *Marijuana and Medicine: Assessing the Science Base*. Washington, DC: Division of Neuroscience and Behavioral Health - Institute of Medicine. National Academies Press; 1999:268

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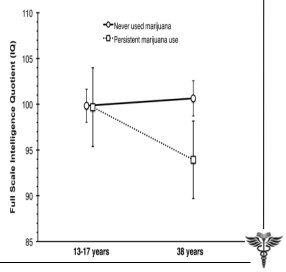
IQ and Brain Development Studies

- Prospective study New Zealand – 1,037 individuals followed for 20 years
- Neuropsych testing at 13 before initiation of cannabis and again at age 38
- IQ decreases by 8 points with early persistent teen use of cannabis
- Meier et al. Proc Natl Acad Sci, 2012



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Long-Term Cannabis Use and Cognitive Reserves and Hippocampal Volume in Midlife. Meier MH et al. AJP 2021, doi: 10.1176/appi.ajp.2021.21060664

N=1,037 followed prospectively, Assessments at birth and at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, 38, 45

Long-term cannabis users showed IQ decline from childhood to midlife (mean 5.5 IQ points), poorer learning and processing speed relative to their childhood IQ, and informant-reported memory and attention problems.

TABLE 2. Child IQ, adult IQ, and IQ change: comparison of long-term cannabis users and five informative subgroups in the Dunedin cohort[a]

	Comparison Group															
	Long-Term Cannabis Users (N=84)		1. Cannabis Nonusers (N=196)		2. Long-term Tobacco Users (N=75)		3. Long-term Alcohol Users (N=57)		4. Midlife Recreational Cannabis Users (N=65)		5. Cannabis Quitters (N=59)		Difference Between Long-Term Cannabis Users and Comparison Groups				
													LT vs. 1	LT vs. 2	LT vs. 3	LT vs. 4	LT vs. 5
IQ	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	p	p	p	p	p
Child IQ	99.3	96.4, 102.2	101.4	99.4, 103.4	93.0	89.8, 96.2	99.3	96.1, 102.5	105.1	102.0, 108.3	97.6	93.7, 101.5	0.14	**0.01**	0.99	**0.006**	0.48
Adult IQ	93.8	90.6, 97.0	102.1	99.9, 104.2	91.5	88.2, 94.7	98.8	95.8, 101.8	101.6	98.1, 105.2	94.3	90.6, 98.0	**<0.001**	0.44	**0.03**	**0.001**	0.85
Δ IQ	−5.5	−7.4, −3.6	0.70	−0.67, 2.0	−1.5	−3.8, 0.75	−0.50	−2.8, 1.8	−3.5	−5.8, −1.2	−3.3	−6.7, 0.01	**<0.001**	**0.02**	**<0.001**	0.17	0.24
Δ ES IQ	−0.37	−0.57, −0.18	0.25	0.12, 0.39	0.03	−0.20, 0.26	0.13	−0.10, 0.37	−0.17	−0.40, 0.06	−0.15	−0.49, 0.18	—	—	—	—	—

[a] Statistical tests of group comparisons are adjusted for sex, but means are unadjusted. Δ IQ=change in IQ (adult IQ minus child IQ); Δ ES IQ= effect size for IQ change (IQ change scores were standardized on the full sample [mean=0, SD=1]); LT=long-term cannabis users. Boldface for p values indicates a statistically significant difference (p<0.05) compared with long-term cannabis users. Dashes for Δ ES IQ indicate that the results are the same as the results for Δ IQ.

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HIGHER DRUG POTENCY = MORE POTENTIAL FOR ADDICTION

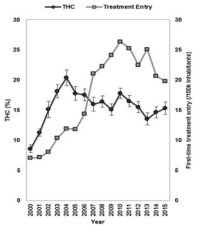
- High-potency THC use is associated with an **increased severity of dependence**, especially in young people.
- High potency =15% THC or higher
- Low potency = 5% THC or lower
- Freeman TP and Winstock AR. Examining the profile of high-potency cannabis and its association with severity of cannabis dependence. Psych Med 2015;45:3181-3189

NICOTINE	3mg	vs.	20mg
ALCOHOL	beer	vs.	Grain alcohol
COCAINE	coca leaf	vs.	cocaine
OPIOIDS	codeine	vs.	Oxycontin
CANNABIS	THC <2%	vs.	THC 17-90%

38

THC POTENCIES ABOVE 15% SHOULD BE CONSIDERED A HARD DRUG

- After the Dutch observed negative impacts from rising THC potencies, a team of health experts concluded that **THC potencies above 15% should be considered a hard drug, like cocaine**
- Laar MV et al. Limitations to the Dutch cannabis toleration policy, assumptions underlying the reclassification of cannabis above 15% THC. In J Drug Policy 2016;34:58-64.

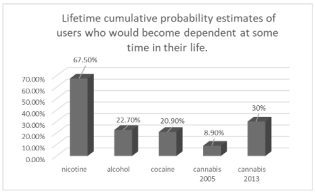


Changes in cannabis potency and first-time admissions to drug treatment: A 16-year study in the Netherlands
Freeman TP et al.
Psychological Medicine 2018

Fig. 1. Mean (95% CI) concentrations of δ-9-tetrahydrocannabinol (THC) in domestic herbal cannabis and first-time cannabis admissions to specialist drug treatment (per 100 000 inhabitants) from 2000 to 2015.

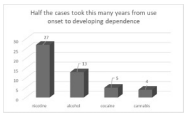
39

Is high potency THC – the new tobacco?



Data obtained from the 2004–2005 Wave 2 NESARC survey data of civilian non-institutionalized population 18 years and older, sub-sample of lifetime nicotine (n = 15,918), alcohol (n = 28,907), cannabis (n = 7389) or cocaine (n = 2259) users.

Lopez-Quintero C et al. Drug and Alcohol Dependence 115 (2011) 120–130

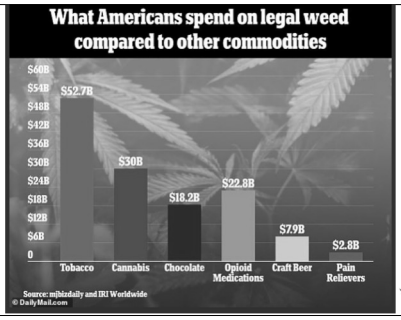


Recent data from the 2012 – 2013 Wave 3 NESARC Data suggest that 30% of those who use marijuana may have some degree of marijuana use disorder. People who begin using marijuana before the age of 18 are four to seven times more likely to develop a marijuana use disorder than adults.

Prevalence of Marijuana Use Disorders in the United States Between 2001-2002 and 2012-2013 Hasin DS et al. JAMA Psychiatry 2015 Dec;72(12):1235-42.

40

Industries Profiting From Addiction



41

Risk of Persistence and Progression of Use of 5 Cannabis Products After Experimentation Among Adolescents

- Barrington-Trimis JL et al. JAMA Network Open 2020; 3(1):e1919792
- A prospective cohort study of 2685 adolescents in California with no history of heavy cannabis use, followed for 12 months
- Overall, the persistence of cannabis use was stronger for combustible cannabis and cannabis concentrate than for blunts or edible cannabis, and the association of progression to higher levels cannabis use was stronger for cannabis concentrate than for any other product, suggesting that combustible cannabis and cannabis concentrate may carry a higher potential for use disorder.
- The rate of persistence and progression after experimentation among adolescents may be amplified with the use of cannabis concentrate compared with other cannabis products.

42

Marijuana Withdrawal Syndrome

- Increased anger
- Irritability
- Anxiety
- Depression
- Restlessness
- Headache
- Loss of appetite
- Insomnia
- Severe cravings for marijuana

Patients are often in a near constant state of withdrawal given the short half-life of most marijuana products which requires them to use every few hours to keep withdrawal symptoms at bay, often making it impossible for them to quit.

Withdrawal symptoms can last 4-6 weeks after cessation (Bonnet and Preuss, Substance Abuse and Rehabilitation 2017:8 9–37)

43

Progression of cannabis withdrawal symptoms in people using medical cannabis for chronic pain

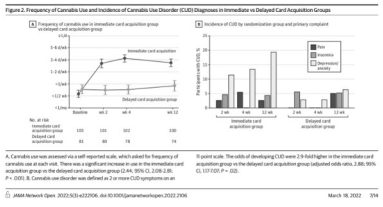
Coughlin LN et al. Addiction 2021

- 527 adults with chronic pain February 2014 - June 2015 in Michigan Medical Cannabis Clinics
- Baseline, 12-month and 24-month assessments of withdrawal symptoms using the Marijuana Withdrawal Checklist–revised
- **Mild withdrawal** class (41%) (average age 48.2 years) – slightly elevated probability of endorsing sleep difficulties and craving cannabis.
- **Moderate withdrawal** class (34%) (average age 45.4) - relatively elevated probabilities of endorsing sleep difficulties, depressed mood, decreased appetite, cannabis craving, restlessness, anxiety and irritability when they went without cannabis.
- **Severe symptom class**(25%) (average age 41.8)had elevated probabilities of symptom endorsement among all withdrawal symptoms
- **More severe cannabis withdrawal – associated with smoking cannabis, longer history of use, greater frequency of use and experiencing more cannabis-related problems**
- Younger age predicts greater odds of worsening withdrawal severity and vaping predicts lower odds of withdrawal symptoms improving over time.

44

Effect of Medical Marijuana Card Ownership on Pain, Insomnia, and Affective Disorder Symptoms in Adults A Randomized Clinical Trial

Gilman JM et al. JAMA Network Open. 2022;5(3):e222106

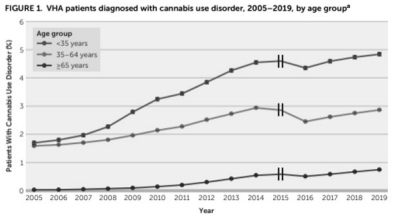


17.1% of participants in the immediate card acquisition group developed a CUD diagnosis throughout the 12 weeks of study after acquiring a card.

Although pain, anxiety, and depressive symptoms were the common reasons cited for the use of cannabinoids, we detected no substantial benefit of a medical marijuana card for any of these outcomes.

45

Trends in Cannabis Use Disorder Diagnoses in the U.S. Veterans Health Administration, 2005–2019



VHA electronic health records (4,403,027–5,797,240) from 2005 to 2019 identifying % with CUD

Black patients had a consistently higher prevalence of cannabis use disorder than other racial/ethnic groups, and increases were greater among Black than White patients in the < 35-year group

Hasin DS et al. AJP in Advance (doi: 10.1176/appi.ajp.22010034) 2022

46

HIGH-POTENCY THC LINKED WITH A TRIPLED RISK FOR PSYCHOSIS

The study analyzed 780 people ages 18-65,
410 with first-episode psychosis and 370 healthy controls

HIGH-POTENCY THC (15% THC or more) 3X INCREASED RISK OF PSYCHOSIS

DAILY USE (15% THC or more) 5X INCREASED RISK OF PSYCHOSIS

LOW POTENCY (less than 5% THC) HAD NO ASSOCIATED RISK FOR PSYCHOSIS

DiForti et al. Lancet Psychiatry, 2019

47

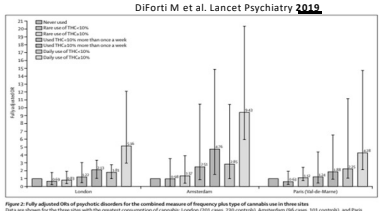
Multicenter case-control study across ten European and one Brazilian site replicates the strong effect of daily use of high-potency cannabis on the odds for psychotic disorder

DiForti M et al. Lancet Psychiatry 2019

Between 2010 and 2015 data from 901 patients with first-episode psychosis - 11 sites and 1,237 population controls from those same sites

THC greater than 10% - 3 times more likely to develop psychosis.
daily – nearly 5 times more likely.

12.2% of cases of first-episode psychosis could be prevented across the 11 sites, rising to 30.3% in London and 50.3% in Amsterdam.

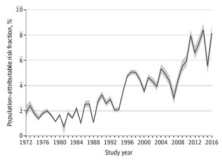


48

Increased potency in past 2 decades has resulted in a 4-fold increase in cannabis use and Schizophrenia

- Very large longitudinal population-based study of **7,186, 834 individuals** in Denmark
- The population-attributable risk fraction for cannabis use disorder in schizophrenia increased from approximately 2% in the period to 1995 to approximately 6% to 8% since 2010.
- This study challenges the often-cited argument against causality that an expected increase in cases of schizophrenia attributable to cannabis use has not been observed.
- Hjorthøj C et al. JAMA Psychiatry July 21, **2021**

Figure 2. Development of the Population-Attributable Risk Fraction (PARF) of Cannabis Use Disorder in Schizophrenia in Denmark



Shaded areas indicate 95% CIs.

49

Rates and Predictors of Conversion to Schizophrenia or Bipolar Disorder Following Substance-Induced Psychosis

- Starzer MSK, Nordentoft M, Hjorthøj C. 2017 AJP.psychiatryonline.org

FIGURE 1. Rates of Conversion to Schizophrenia and Bipolar Disorder Following Incident Substance-Induced Psychosis in a Registry Study (N=6,788)

32.2% of patients with a substance-induced psychosis later converted to either bipolar disorder or schizophrenia.

The highest conversion rate (47.4%) was found for cannabis-induced psychosis.

Young age was associated with a higher risk of conversion to schizophrenia; the risk was highest for those in the range of 16–25 years.

Self-harm after a substance induced psychosis was significantly linked to a higher risk of converting to both schizophrenia and bipolar disorder.

50

Rates and correlates of cannabis-associated psychotic symptoms in over 230,000 people who use cannabis

Schoeler T, Ferris J, Winstock AR. Translational Psychiatry 2022;12:369

- analyzed data from an international sample of people who use cannabis (PWUC) (n = 233,475).
- Looked at the lifetime occurrence of CAPS - hallucinations and/or paranoia requiring emergency medical treatment following the use of cannabis
- Found acute self-limiting psychotic symptoms in the context of cannabis use may occur in about 1 in 200 people who use cannabis' lifetime
- factors associated with an elevated risk of CAPS (e.g., young age, mental health vulnerabilities, particularly psychosis-liability, the use of high-potency resin).
- highest rates among PWUC found residing in Denmark, where resin was the most popular type of cannabis -THC concentration of 23% or higher since 2014, one of most potent forms of cannabis in Europe

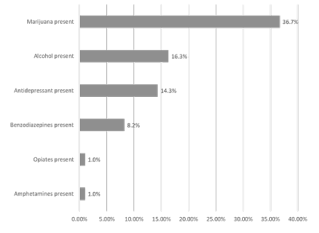
51

Suicide and Adolescence Cannabis Use

- Systematic review and meta-analysis
- Eleven studies, N=23,317 adolescents
- Risk of depression OR = 1.4
- Suicidal Ideation OR = 1.5
- Suicide attempt OR = 3.5
- Significantly higher in adolescent cannabis users than in non-users
- Gobbi G et al. Associations of cannabis use in adolescence and risk of depression , anxiety, and suicidality in young adulthood: a systematic review and meta-analysis. JAMA Psychiatry. 2019;76:426-434.

52

THC IS THE NUMBER ONE DRUG FOUND IN 69 TEENS, age 15-19, WHO DIED BY SUICIDE in Colorado in 2018



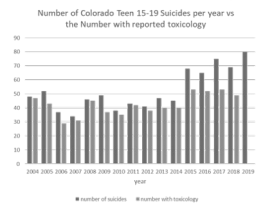
Colorado's teen suicide rate increased 58% from 2016-2019, the highest increase in the country

United Health Foundation

Colorado Public Health and Environment, Colorado Violent Death Reporting System, 2019

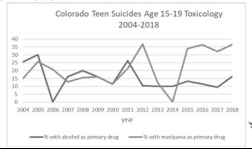
53

Significant increase in teens 15-19 Suicides in past 5 years correlating with increased THC potency



Colorado Violent Death Reporting System

Significant increase in the number of teen suicides in Colorado in last five years - marijuana is the number one drug found when toxicology is reported - seems to correlate with the increased THC potency and availability/use of concentrates – we need data to confirm that.



54

US trends in the association of suicide ideation/behaviors with marijuana use among adolescents ages 12–17 and differences by gender and race/ethnicity Flores MW et al. Frontiers in Psychiatry 202310.3389/fpsyt.2022.1057784

- 2015–2019 data from the National Survey on Drug Use and Health (NSDUH)
- Adolescents between the ages of 12 and 17 (n = 73,986)
- Past-year marijuana use is a significant risk factor for suicide ideation/behavior among adolescents
- Rates of suicide ideation/behavior increased as the frequency (number of days) of marijuana use increased.
- No gender differences in any suicide outcomes regardless of marijuana use frequency
- Greater frequency of marijuana use increased risk of suicide ideation/behavior.
- Increase in risk did not vary significantly by race/ethnicity

55

Association of Cannabis Use With Self-harm and Mortality Risk Among Youths With Mood Disorders

- Fontanella CA et al. JAMA Pediatrics 2021
- A population-based retrospective cohort study was performed using Ohio Medicaid claims data linked with death certificate data. The analysis included 204,780 youths (aged 10-24 years) with a diagnosis of mood disorders between July 1, 2010, and December 31, 2017, who were followed up to 365 days from the index diagnostic claim until the end of enrollment, the self-harm event, or death.
- Cannabis use disorder is common among adolescents and young adults with mood disorders and is associated with an elevated risk of self-harm, overall mortality, and death by unintentional overdose and homicide in this already vulnerable population

56

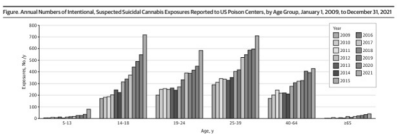
Suspected Suicide Attempts by Self-Poisoning Among Persons Aged 10–19 Years During the COVID-19 Pandemic — United States, 2020–2022 Morbidity and Mortality Weekly Report/ April 21, 2023 / Vol. 72 / No. 16

- In 2020, suicide was the second leading cause of death among persons aged 10–14 years and the third leading cause among those aged 15–24 years.
- National Poison Data System
- Suspected suicide attempts by self-poisoning among persons aged 10–19 years increased 30.0% in 2021 as compared with prepandemic rates (2019)
- 73.0% increase among children aged 10–12 years
- 48.8% among adolescents aged 13–15 years
- 36.8% among females
- acetaminophen, ibuprofen, sertraline, fluoxetine, and diphenhydramine the substances most frequently involved

57

Suspected Suicidal Cannabis Exposures Reported to US Poison Centers, 2009-2021

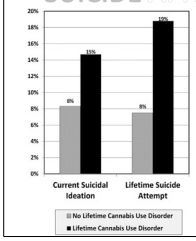
Graves JM et al. JAMA Network Open. 2023;6(4):e239044. doi:10.1001/jamanetworkopen.2023.9044 April 19, 2023



Intentional, suspected suicidal cannabis exposures reported to US poison centers increased from 2009 to 2021. Increases during and after the pandemic were notable and greatest among children and females. Due to the cross-sectional nature of the data, a causal association between cannabis use and a suicide attempt could not be identified. However, these two articles together make a compelling argument about cannabis use contributing to suicide. During the pandemic many states considered marijuana dispensaries to be "essential" businesses.

58

CANNABIS USE DISORDER IS ASSOCIATED WITH SUICIDE ATTEMPTS AMONG VETERANS



- 3,233 veterans in cross-sectional, multi-site study by Veterans Affairs (VA).
- Cannabis use disorder was **significantly associated with both current suicidal ideation and lifetime history of suicide attempts** compared to veterans with no lifetime history of cannabis use disorder.
- The **significant difference persisted** even after adjusting for sex, PTSD, depression, alcohol use disorder, non-cannabis drug use disorder, history of childhood sexual abuse and combat exposure.
- Kimbrel NA et al. J Psychiatric Research **2017**;89;1-5

59

Marijuana is NOT the answer for PTSD

- A growing number of states have identified PTSD as an approved condition for medical marijuana without any scientific studies backing this up
- Observational study of 2276 Veterans treated in VA PTSD treatment programs
  - Never used marijuana – significantly lower symptom severity 4 months later
  - "Starters" – highest levels of violent behavior and PTSD symptoms 4 months after treatment
  - "Stoppers" – lowest level of PTSD symptoms at 4 months after treatment
  - Wilkinson et al. J Clin Psychology 2015
- Reasons why Marijuana is not the answer
  - Temporary relief – numbing, disconnecting from the traumatic emotions
  - Cognitive impairment, a-motivational syndrome, potential for psychosis or worsening psychosis from PTSD
  - Addiction potential and vicious cycle
  - False memories

60

RCT of cannabis for PTSD failed to show any benefit over placebo Bonn-Miller MO et al. PLOS ONE 2021

- randomized, double-blind, placebo-controlled, crossover trial of smoked cannabis containing three different concentrations of THC and CBD, and placebo
- High THC = approximately 12% THC and < 0.05% CBD); High CBD = 11% CBD and 0.50% THC; THC+- CBD = approximately 7.9% THC and 8.1% CBD, and placebo = < 0.03% THC and < 0.01% CBD. Participants were provided 37.8 grams (1.8 grams/day)for the three-week ad libitum treatment period
- Total cannabis withdrawal symptoms averaged in the moderate range for all treatment groups at the start of Stage 1 (despite two weeks of abstinence prior to randomization), then generally reduced to the mild to moderate range by the end of treatment in Stage 1. Participants who received High THC in Stage 1 reported a significant increase in withdrawal following one week of cessation from Stage 1 treatment, which averaged in the moderate range following cessation
- This study failed to find a significant group difference between smoked cannabis preparations containing High CBD, High THC, and THC+CBD against placebo in regard to their impact on PTSD symptoms

61

Short and Long-Term Effects of Cannabis on Symptoms of Post-Traumatic Stress Disorder LaFrance EM et al. J Affective Disorders 2020;274:298-304

- Anonymous data from Strainprint® for 404 medical cannabis users who self-identified as having PTSD and who used the app to track symptoms of intrusive thoughts, flashbacks, irritability, and anxiety.
- Users indicate the strain of cannabis that they are about to use as well as the producer/distributor of that strain by choosing from a selection of over 3,000 cannabis products sold in Canada.
- Results indicate that acute cannabis intoxication provides temporary relief from intrusions, flashbacks, irritability, and anxiety. However, baseline PTSD symptom ratings did not change over time, and they detected evidence that people used higher doses to manage anxiety over time, which may be indicative of the development of tolerance to the drug.
- Collectively these results indicate that cannabis may reduce PTSD symptoms in the short-term but may not be an effective long-term remedy for the disorder.

62

Frequent cannabis use worsens PTSD symptoms in Veterans

- Hill ML et al. (2022). Cannabis use among U.S. military veterans with subthreshold or threshold posttraumatic stress disorder: Psychiatric comorbidities, functioning, and strategies for coping with posttraumatic stress symptoms. Journal of Traumatic Stress, 35, 1154–1166
- 2019–2020 National Health and Resilience in Veterans Study (NHRVS) 4,069 U.S. military veterans
- Compared with veterans who did not use cannabis or used it infrequently, those who used cannabis frequently were roughly twice as likely to screen positive for co-occurring MDD, GAD, and SI; showed small-to-moderate decrements in cognitive functioning; and were 2–6 times more likely to endorse using avoidance strategies as a primary means of managing their PTSD symptoms.

63

Trends in emergency department visits associated with cannabis use among older adults in California, 2005–2019

Han BH et al. J Am Geriatr Soc. 2023;1–8.

- Retrospective cohort study of adults aged ≥65 - 2005 through 2019 from all non-federal acute care hospitals across the state of California
- The cannabis-related ED visit rate increased significantly for adults aged ≥65 and all subgroups ($p < 0.001$)
- 20.7 per 100,000 visits in 2005 to 395.0 per 100,000 ED visits in 2019, a 1804% relative increase
- Adults aged 75–84 had the largest relative percent change with a 2208.3% increase
- Older Black adults had the highest ED visit rate in 2019 and the largest absolute increase while older males had a higher ED visit rate in 2019 and a greater absolute increase than older women

64

Drug: Drug Interactions with Cannabis

- ASRA pain medicine consensus guidelines on the management of the perioperative patient on cannabis and cannabinoids. Shah S et al. Reg Anesth Pain Med 2023;0:1–21. doi:10.1136/rapm-2022-104013
- All patients should be questioned about cannabinoid use, dose and frequency, route of administration, and time of last use
- Cannabinoids can produce significant physiologic changes and can potentially interact with anesthetics that can lead to complications
- Patients taking cannabinoids preoperatively may also report increased postoperative pain levels, which could affect perioperative management.
- In the perioperative setting, special attention should be paid to potential cannabinoid interactions with warfarin, direct oral anticoagulants, and clopidogrel – but there are many more drug: drug interactions

65

Persistency of cannabis use predicts violence following acute psychiatric discharge

- 1,136 recently discharged psychiatric patients followed at 4 10-week time intervals and evaluated for marijuana, alcohol and cocaine use as well as episodes of violence (1992-1995)
- Persistency of cannabis use was associated with an increased risk of subsequent violence, significantly more so than with alcohol or cocaine
- Dugre et al. Frontiers in Psychiatry 2017;8:176

66

Cannabis use is a significant risk factor for violent behavior in early phase psychosis

- 265 patients with early psychosis followed prospectively for 36 months – dichotomized based on presence or absence of violent behavior
- Cannabis use disorder was the strongest risk factor of violent behavior
- CUD in 61% of patients with VB, 23% in those with no CUD
- Age of onset of cannabis use – 15 in violent patients vs 17 in non-violent patients
- Cannabis use linked to impulsivity and lack of insight
- Moulin V et al. Frontiers in Psychiatry 2018

67

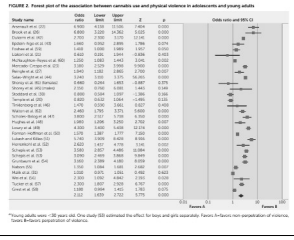
Persistent cannabis use as an independent risk factor for violent behaviors in patients with schizophrenia

- Beaudoin M et al. npj Schizophrenia (2020) 6:14 ; https://doi.org/10.1038/s41537-020-0104-x
- 1460 patients enrolled in the trial, 965 were followed longitudinally.
- Persistent cannabis use predicted subsequent violence.
- Violence did not predict cannabis use.
- The relationship was unidirectional and persisted when controlling for stimulants and alcohol use.
- As cannabis is an important risk factor for violence in the schizophrenia population, its consumption should be considered separately from that of other drugs when assessing and managing risks in clinical and in legal settings

68

Association Between the Use of Cannabis and Physical Violence in Youths: A Meta-Analytical Investigation

Dellazizzo L et al. AJP in Advance (doi: 10.1176/appi.ajp.2020.19101008)



30 studies were included in this meta-analysis, yielding a total of 296,815 adolescents and young adults

Results demonstrate a moderate association between cannabis use and physical violence, which remained significant regardless of study design and adjustment for confounding factors (i.e., socioeconomic factors, other substance use). Cannabis use in this population is a risk factor for violence.

69

Cannabis use disorder, anger, and violence in Iraq/ Afghanistan-era veterans

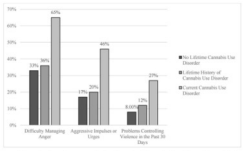


Fig. 1. Association between cannabis use disorder and anger, aggressive impulses, and problems controlling violence in the past 30 Days among Iraq/Afghanistan-era veterans (N = 3031).

Results indicated that current CUD was significantly positively associated with difficulty managing anger (OR = 2.93, p < .05), aggressive impulses/urges (OR = 2.74, p < .05), and problems controlling violence in past 30 days (OR = 2.71, p < .05) even accounting for demographic variables, comorbid symptoms of depression and PTSD, and co-morbid alcohol and substance use disorders

Dillon KH et al. Journal of Psychiatric Research 138 (2021) 375–379

70

Marijuana Use is Associated with Intimate Partner Violence Perpetration Among Men Arrested for Domestic Violence Shorey RC et al. Transl Issues Psychol Sci. 2018 ; 4(1): 108–118

- Study (N = 260) examined whether marijuana use was associated with Intimate Partner Violence (IPV) perpetration after controlling for:
  - Alcohol Use & Problems
  - Antisocial Personality Symptoms
  - Relationship Satisfaction
  - All Known Risk Factors for IPV
- Findings demonstrated that marijuana use was positively & significantly associated with psychological, physical & sexual IPV perpetration
- Even after controlling for alcohol use & problems, antisocial personality symptoms & relationship satisfaction
- Marijuana item asked participants "How often do you use cannabis?" with instructions for participants to think of the year prior to entering their BIP
- This is the only item on the DUDIT that is specific to marijuana use

71

Association of Cannabis Use with Intimate Partner Violence among Couples with Substance Misuse

- Flanagan JC et al. Am J Addict. 2020 July ; 29(4): 323–330
- First study to examine the association between both self-reported cannabis use and urine drug screens positive for the THC metabolite THC-COOH and IPV perpetration and victimization among a community sample of substance misusing couples.
- Participants were 33 couples (66 individual participants)
- six participants who had positive urine drug screens declined having used THC in the past 90 days. These data underscore the importance of utilizing a multimethod assessment
- greater quantity and frequency of cannabis use was significantly associated with greater physical IPV perpetration and victimization, after controlling for age, gender, race, and quantity and frequency of alcohol and stimulant use.

72

A Review of Cases of Marijuana and Violence

Miller NS et al. Int. J. Environ. Res. Public Health 2020, 17, 1578

- 1. Marijuana use causes violent behavior through increased aggressiveness, paranoia, and personality changes (more suspicious, aggressive, and anger).
- 2. Recent illicit and "medical marijuana" is of much high potency and more likely to cause violent behavior.
- 3. Marijuana use and its adverse effects should be considered in cases of acts of violence as its role is properly assigned to its high association.
- 4. Recognize that high potency marijuana is a predictable and preventable cause of tragic violent consequences.

Table 4. What did the cases have in common?

Cases of Marijuana Use and Symptoms	
Case	**Symptom**
Anthony Comello	Paranoia
Man in Rustavi	Aggressiveness, Personality Change
Nikolas Cruz	Psychosis, Hallucinations
Devin Patrick Kelley	Aggressiveness, Personality Change
Salaman Abedi	Aggressiveness, Personality Change, Paranoia
Richard Rojas	Paranoia, Hallucinations
Arcan Cetin	Aggressiveness, Personality Change
Stashi Uematsu	Psychosis, Paranoia
Robert Dear	Aggressiveness, Paranoia
M.Y. Abdulazeez	Aggressiveness, Paranoia
Dylan Roof	Paranoia, Hallucinations
Michael Brown	Aggressiveness, Personality Change, Paranoia
Dzhokar Tsarnaev	Aggressiveness, Personality Change
Tamerlan Tsarnaev	Aggressiveness, Personality Change
Jared Loughner	Paranoia, Psychosis

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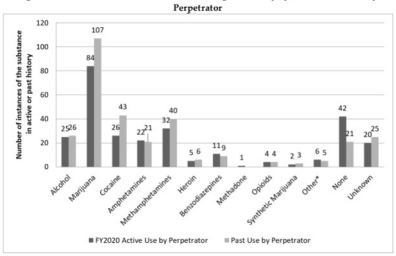
Figure 11. FY2020 Confirmed Child Abuse or Neglect Fatality by Substance Abuse by Perpetrator



*Other includes ecstasy, morphine, and Benadryl.
Source: DFPS individual case reviews

FY2020 Child Fatality and Near Fatality Annual Report (state.tx.us)

For FY2020, in Texas, 180 of the 251 child fatalities caused by abuse or neglect involved a parent or caregiver actively using a substance and/or under the influence of at least one substance that affected the ability to care for the child.

Marijuana was the substance most identified as an active substance in child abuse and neglect related fatalities and was identified as prior use in 107 of the cases.

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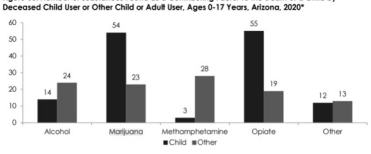
Arizona Child Fatality Review Program 2022

Figure 60. Number of Substances Found as a Contributing Factor to the Death of a Child by Deceased Child User or Other Child or Adult User, Ages 0-17 Years, Arizona, 2020*



*More than one substance and/or more than one user may have been involved in the child's death.

Among substance use related deaths, poisoning (42%) was the leading factor that caused or contributed to the death for children ages 0-17 years (Table 28). Of the 66 poisoning deaths, 60 were opiate overdoses and fentanyl was responsible for 57 opiate poisonings.

Table 28. Number of Deaths where Substance Use was a Direct or Contributing Factor to the Death of the Child, Ages 0-17 Years, Arizona, 2020

Factors	Number	Percent

Opiates and marijuana were the most common substances which caused or contributed to the death of the child where the child was the user. In 59% of the substance use related deaths, another individual (child or adult) was using or abusing alcohol or drugs which caused or contributed to the death of the child. Methamphetamine and marijuana were the most common substance which caused or contributed to the death of the child where another individual (child or adult) was using or abusing alcohol or drugs which caused or contributed to the death of the child.

75

Hypothesized mechanisms for both acute and chronic cannabis intoxication causing violence

Delazizzio L et al. Frontiers in Psychiatry 2020; 11

- Impairs neurocognitive domains (e.g. executive functioning) and creates perceptional distortions (e.g. interpreting neutral actions as aggressive)
- Impairs a user's ability to suppress aggressiveness
- Heightens physiological arousal making users feel paranoid, anxious or panicky
- Withdrawal symptoms, which are reported by up to a third of regular users are of clinical significance as they can be impairing and associated with trouble ceasing use These symptoms typically onset within 24 to 48 h following abrupt cessation in frequent users and contribute to irritability, restlessness, and anxiety that may likewise be associated with aggression

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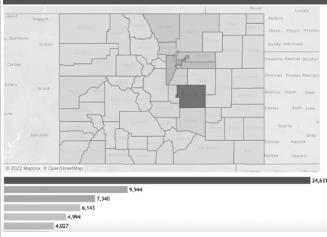
Does cannabis use affect competency? Or restoration to competency?



CDPHE Medical Marijuana Registry – highest number of medical marijuana cards are in El Paso County

Could this possibly have anything to do with this?:

"Hearing a lot that there are more competency cases in El Paso than anywhere else"

Is anyone asking the questions about medical marijuana use and types, routes, frequency, potency of these individuals looking at competency evals and need for restoration?

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CANNABINOID HYPEREMESIS SYNDROME

Once extremely rare, but now flooding Emergency Rooms in Colorado

Uncontrolled cyclic vomiting that often requires emergency treatment to stop vomiting and rehydrate

Severe abdominal pain

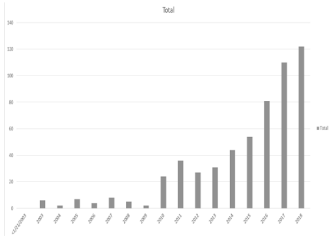
Medications don't control the symptoms

Causing people to receive full medical work-ups costing hundreds of thousands of dollars

Higher THC potency is causing people to be addicted and use more often, increasing risk of CHS

Only solution is quit using cannabis

CHS INCREASING EVERY YEAR



Data collected by Brad Roberts, MD, ER physician in Parkview, Pueblo, CO

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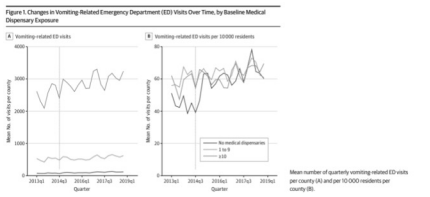
Changes in Emergency Department Encounters for Vomiting After Cannabis Legalization in Colorado

From January 1, 2013, through December 31, 2018, there were a total of 820,778 vomiting-related ED visits.

Annual vomiting-related health care encounters increased from 119,312 in 2013 to 153,699 by 2018 (a 29% increase).



Substantial increase in vomiting-related ED visits in Colorado after legalization of recreational cannabis.

79

Cannabinoid hyperemesis syndrome in North America: evaluation of health burden and treatment prevalence Andrews CN et al. Aliment Pharmacol Ther. 2022;56:1532–1542.

Survey data suggest patients with CHS almost universally suffer from a cannabis use disorder, which has significant treatment implications.

Treatment prevalence in the ED has increased substantially over a very short time period, with the highest rates seen during the Covid-19 pandemic.

Treatment prevalence among chronic cannabis users was as high as 6 per 1000 in the 16–24 age group.

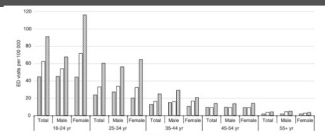


FIGURE 1 Population-based estimate of treatment prevalence

TABLE 5 Treatment prevalence estimates amongst chronic cannabis users in Alberta

	Per 1000 cannabis users (95% CI)		Per 1000 total population (95% CI)	
	16–24 years	25–44 years	16–24 years	25–44 years
2018	3.1 (2.7–3.6)	2.4 (2.1–2.7)	0.4 (0.4–0.5)	0.2 (0.2–0.2)
2019	4.4 (3.9–4.9)	3.3 (2.9–3.5)	0.6 (0.5–0.7)	0.2 (0.2–0.3)
2021	6.4 (5.8–7.0)	5.4 (5.0–5.9)	0.9 (0.8–1.0)	0.4 (0.4–0.5)

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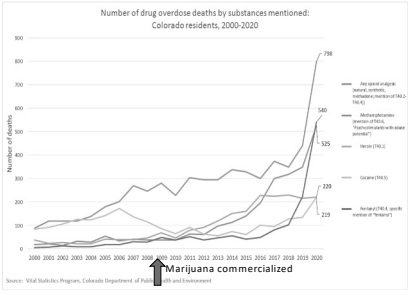
MARIJUANA HAS NOT DECREASED OPIOID OVERDOSE DEATHS IN COLORADO



2020 data shows a **136% increase in prescription overdose deaths** and 864% increase in fentanyl deaths since 2000

First use of marijuana before the age of 18 has the highest contribution to opiate use disorders (OUD)- a much higher contribution compared to early initiation of alcohol.

Wadeker AS, Understanding opiate use disorders (OUD) using a tree-based classifiers. Drug and Alcohol Dependence 2020

81

Cannabis is NOT the solution to the opioid epidemic

- Bachhuber MA et al. JAMA Intern. Med. **2014**;174:1668-1673
  - Study cannabis industry likes to refer to
  - Found that states with medical cannabis laws had a lower-than-expected opioid overdose mortality rates from 1999-2010
  - Estimated 24.8% reduction in deaths per 100,000 population
  - "proof that expanding cannabis laws would reverse the opioid epidemic"
- Shover CL et al. PNAS **2019**;116:12624-12626
  - Used the same methods to expand the analysis through 2017
  - Between 2010 and 2017, 32 states enacted medical cannabis laws
  - Initial findings did not hold over the longer period but reversed direction
  - States with medical cannabis law had a 22.7% increase in opioid overdose deaths

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Cannabis increases the risk of suicidal ideation in those with Opioid Use Disorder

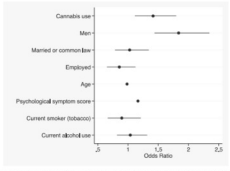

FIGURE 2. Forest plot of multivariable regression analysis: The risk of suicidal ideation in patients with opioid use disorder (n = 2335).

2,334 individuals with OUD on OAT

Half reported current cannabis use, 68% of whom reported daily use. Twenty-four percent of participants who use cannabis endorsed suicidal ideations in the past 30 days, compared to 17% of those who do not use cannabis Cannabis use, regardless of frequency of use, is associated with a 40% increase in the odds of endorsing suicidal ideation.

Naji L et al. The Role of Cannabis Use in Suicidal Ideation Among Patients With Opioid Use Disorder J Addict Med. **2021**;15:370-375

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WHAT CAN WE DO ABOUT THIS?

- Educate, Educate, Educate
- Increase treatment availability, including in jails/prisons
- PSAs about the risks
- Enact Legislation for stricter regulations
- Collect data on cannabis use
  - Don't just ask about alcohol, tobacco, drugs – add cannabis
  - Document product, route, frequency, potency, age of onset
- Do Drug screens
  - Don't opt for the "Colorado Panel"

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What Colorado HB21-1317 accomplished

- Tangible Educational Resource Requirement – handout listing RISKS AND PRECAUTIONS
- WARNING: Use of Marijuana Concentrate may lead to:
  - 1. Psychotic symptoms and/or Psychotic disorder (delusions, hallucinations, or difficulty distinguishing reality)
  - 2. Mental Health Symptoms/Problems
  - 3. Cannabis Hyperemesis Syndrome (CHS) (uncontrolled and repetitive vomiting)
  - 4. Cannabis use disorder / dependence, including physical and psychological dependence.
- Concentrate Serving Size: .
- Limits on concentrates – 2 grams per day 18-20, 8 grams per day for adults (previously was 40 grams per day for all with medical card)

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Observations from Probation Officers in Colorado

1. Transfer of Drug Use – clients are simply trading one addiction for another; we've seen a lot of folks give up alcohol, methamphetamine, etc., only to turn around and start using marijuana (oftentimes habitual use, even though there was absolutely no marijuana use prior).

2. Redefining "Sobriety" – the majority of our clients today claim they are, in fact, "sober" because they are now free of their historical drug(s) of choice (meth, opiates, alcohol), even though they are using marijuana regularly

3. Interference with Treatment – clients are making limited progress (or no progress at all) in substance use and/or mental health treatment because their original symptoms are being exacerbated by marijuana use.

4. Self-Medicating with Marijuana – many of our clients seem to be under the impression that it's OK (or "noble") to refuse well-established medications for depression, anxiety, etc., because they can treat those symptoms with marijuana instead, and marijuana is "natural".

5. Unwillingness to enter programs like treatment courts – clients have now realized that participating in a treatment court requires them to be free of all drugs (including medical marijuana), but regular probation does not – if they are able to obtain a valid MMJ card, probation will allow use unless there's a very good reason not to (and that's a heavy burden to meet). Numbers in treatment courts are dropping and probation is having to redefine what "success" looks like.

6. The concept of Harm Reduction – a concept that is often talked about but more often misunderstood; too many clients (and professionals) conclude that someone using marijuana is somehow a better alternative to that person using alcohol, meth, cocaine, etc. This usually comes with the following argument – "it's legal and they're going to use it once they get off probation anyway, so is it really worth fighting this battle?"

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We Need Better Data

- There are currently 75,000 people on probation in Colorado. How many of them have medical marijuana cards?
- What is the route/potency/dosage/frequency of THC they are using?
- How has the use of THC impacted their ability to complete requirements of probation/parole/competency restoration?
- Has the doctor recommending medical marijuana followed the requirements of HB21-1317? Are they following the science?
- The Colorado Task Force Concerning the Treatment of Individuals with Behavioral Health Disorders in the Criminal and Juvenile Justice System (BHDCJS) - Medical Marijuana Subcommittee
  - Working on ways to obtain the data necessary to answer these questions

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Sample Survey Questions

- Aurora Municipal Court Probation Medical Marijuana Survey
- This information will be used only for research
- Do you have a Red Card (approval to use Medical Marijuana)? ☐ No ☐ Yes
- If yes, when did you get it? Month: _____Year: _____ Date of first Red Card: Month: _____Year: _____
- If yes, what medical cannabis products do you use (please check all that apply)? ☐ Edibles ☐ Flower/Bud ☐ Shake ☐ Wax ☐ Shatter ☐ Dab ☐ Hash Oil
- If yes, do you use THC potency higher than 10%? ☐ No ☐ Yes ☐ Unknown

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Barriers to better understanding the issues

- Judges approve use just based on the fact a doctor recommended it.
- Presentencing Investigative reports very rarely done by a certified addiction counselor or equivalent
- Probation officers and treatment providers often recognize that the client's use of medical marijuana is negatively affecting their ability to complete the requirements of their probation/treatment.
- However, they are not empowered to do anything about it and treatment providers fear being sued when they try to say anything about it.

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Recommendations

- Establish criteria for treatment providers working with those court ordered to treatment
  - Require therapists to have all clients who plan to get red cards or have red cards when they first see the therapist assigned to them, sign releases of information for both the physician who has recommend the red card and for the treating physician
  - This allows a full transparency of the justifiable need for medical marijuana and what type is being recommended
  - If the treating physician has reasons why it should not be used, this should be brought to the attention of the court.
  - If the treating physician believes they would benefit from THC – they should have a prescription for an FDA approved THC medication, not using dispensary cannabis, while in court ordered treatment.

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Questions?

libbystuyt@msn.com

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