

Cannabis, Opioids, and Public Health Concerns Kenneth Finn, MD

Objectives

- have on communities
- systems
- increased access to marijuana

Explain the effects of increasing access to marijuana may

Describe the impacts of public health across multiple organ

Illustrate to your colleagues the public health impacts, particularly to the health care system, when there is

Disclosures

- Honoraria for public speaking
- Royalties for Cannabis in Medicine: An Evidence-Based Approach















Dronabinol











Terminology

- Cannabis-based medication
 - classified as 'cannabis-derived' or 'cannabis-based' medicines.
 - Examples: Epidiolex[®], Sativex [®](natural); dronabinol (semi-synthetic); nabilone (synthetic) \bullet
- Medical cannabis
 - used for medical reasons.
 - Poorly regulated and poorly tested for contaminants ${\bullet}$

Registered medicinal cannabis extracts with defined and standardized THC and THC/CBD content should be

Cannabis plants and plant material, for example flowers, marijuana, hashish, buds, leaves or full plant extracts





National Ambulatory Care Survey, 2018

- National Survey
- Why people see their doctor
- Knee pain the only pain diagnosis in top 20 reasons
- Others <u>not</u> in top 20: Back pain, Shoulder pain, Neck pain,

Neuropathy, Headache, Fibromyalgia, Cancer, Seizure, other



https://www.cdc.gov/nchs/data/ahcd/namcs_summary/2018-namcs-web-tables-508.pdf



https://www.tandfonline.com/doi/full/10.1080/24734306.2017.1392715

- **Synergistic systems**
- Both belong to the rhodopsin subfamily of **G-protein** coupled receptors
- Both, when activated, reduce cellular levels of cyclic adenosine monophosphate (cAMP) by inhibiting adenylyl cyclase



- Both receptors found at presynaptic terminals
- Both receptors co-localize in <u>GABA-ergic neurons</u>
- Both systems <u>share</u> pharmacologic profiles
- Sedation, <u>antinociception</u>, hypotension, hypothermia, decreased intestinal motility, drug-reward reinforcement
- Naloxone may have effects on the cannabinoid system in several animal models



From: Benefits and harms of medical cannabis: a scoping review of systematic reviews



Indication for Cannabis Use

Indications for cannabis use across included reviews

Pratt, M., Stevens, A., Thuku, M. et al. Benefits and harms of medical cannabis: a scoping review of systematic reviews. Syst Rev 8, 320 (2019)

U.S. National Survey Data Show High Rates of New Cases and Persistence of Chronic Pain

- May 2023; JAMA
- NIH; National Center for Complementary and Integrative Health
- New cases of <u>chronic pain occur more often</u> among U.S. adults than new cases of several other common conditions, including diabetes, depression, and high blood pressure
- Respondents who were pain free in 2019, <u>6.3 percent</u> reported chronic pain in 2020, with an incidence of 52.4 cases per 1,000 persons per year
- Among those who reported pain that was not chronic in 2019, 14.9 percent reported chronic pain in 2020. This is <u>more than twice</u> the percentage seen among those who were pain free in 2019







- There is <u>substantial</u> evidence that cannabis is an effective treatment for chronic pain in adults (National Academies of Science; 2017)
 - <u>https://www.nap.edu/catalog/24625/the-health-effects-of-cannabis-and-cannabinoids-the-current-state</u>
 - Nabiximols, synthetic cannabinoids
 - **NOT** dispensary cannabis/medical cannabis



- Medical cannabis laws are associated with significantly **lower** state-level opioid overdose mortality rates (Bachhuber, JAMA, 2014)
 - https://pubmed.ncbi.nlm.nih.gov/25154332/
- Medical cannabis laws are associated with significant reductions in opioid **prescribing** in the Medicare Part D population (Bradford, JAMA, 2018)

https://pubmed.ncbi.nlm.nih.gov/29610897/



- No evidence that cannabis use reduced pain severity or interference or exerted an <u>opioid-sparing effect</u> (Campbell, Lancet, 2018)
 - https://pubmed.ncbi.nlm.nih.gov/29976328/
- States passing a medical cannabis law experienced a **22.7% increase** in overdose deaths (Shover, Humphries; Stanford, 2019)

https://www.pnas.org/content/116/26/12624





- **Data do not strongly support** the use of cannabinoids for **chronic pain** nor do (Babalonis, 2019)
 - https://www.sciencedirect.com/science/article/pii/S0924977X20300651?via%3Dihub
- marijuana for prescription opioids (Segura, JAMA, 2019)
 - m source=articlePDF&utm content=jamanetworkopen.2019.7216

prospective studies demonstrate significant cannabinoid-mediated **opioid-sparing effects**

Medical marijuana law enactment was **not associated** with a **reduction** in individual-level nonmedical **prescription opioid use**, contradicting the hypothesis that people would substitute

https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2738028?utm_campaign=articlePDF&utm_medium=articlePDFlink&ut



- overdose (Kim, January 2022)
- effect of MCLs on opioid overdoses
 - edium=articlePDFlink&utm source=articlePDF&utm content=jamanetworkopen.2019.7216

No overall protective relationship between state MCLs and opioid

This is an additional source of information <u>countering</u> claims of a protective

https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2738028?utm_campaign=articlePDF&utm_m



- March 2022
- Effect of Medical Marijuana Card Ownership on Pain
- Acquisition of a medical marijuana card led to a **higher incidence and** severity of CUD; resulted in no significant improvement in pain
 - https://pubmed.ncbi.nlm.nih.gov/35302633/



Medical Marijuana CO

- January 2023; CO Legislative Report
- 55% of MMJ recommendations by 10 providers in 2022
- minutes)

6	2,001-3,000
3	3,001-4,000
0	4,001-5,000
1	5,001-6,000
1	6,001-7,000
1	7,000-8,000

• 3 providers made 25% of all recommendations (one patient every 20







- Hyperalgesia
- Note 5 ng/ml considered impaired driving although per se limits difficult to determine



Cannabis Hyperalgesia

- July 2023; American Journal of Addictions
 - A phenomenon <u>similar</u> to opioid induced hyperalgesia (OIH)
 - Daily cannabis use may make chronic pain worse over time by reducing pain tolerance

https://onlinelibrary.wiley.com/doi/epdf/10.1111/ajad.13456







Cannabis-Based Medicine for Neuropathic Pain and Spasticity

- July 2023; Pharmaceuticals
 - THC or CBD alone or in combination on neuropathic pain or spasticity in patients with either MS or SCI

https://www.mdpi.com/1424-8247/16/8/1079

<u>No effect</u> was found between placebo and active treatment with





- ullet2020)
 - https://www.cdc.gov/mmwr/volumes/69/su/su6901a5.htm?s_cid=su6901a5_w
- After 3 years of first trying marijuana vs. opioids, marijuana has a much higher percentage of addiction in \bullet adolescents (NIH; JAMA Pediatrics, 2020)
 - faster-development-substance-use-disorders
- \bullet
 - https://www.sciencedirect.com/science/article/abs/pii/S0376871620300041 \bullet

The number one risk factor for adolescent opioid misuse is having EVER use marijuana (lifetime use; YRBS,

https://www.nih.gov/news-events/news-releases/younger-age-first-cannabis-use-or-prescription-drug-misuse-associated-

The **predominant predictor** of **adult** opioid misuse is having used marijuana before the age of 18 (Wadekar)



- Cannabis use **increases** the risk of developing opioid use disorder (Olfson)
 - https://pubmed.ncbi.nlm.nih.gov/28946762/
- Drivers testing positive for marijuana were **28% more likely** to test positive for prescription opioids (FARS, 2017)
- Drivers testing positive for marijuana were **twice as likely** to test positive for prescription opioids (NRS, 2017)
 - https://pubmed.ncbi.nlm.nih.gov/32066484/



- 75,949 adults $\underline{aged} \ge 50$ who participated in the year 2002–2014 (NSDUH)
- Past-year marijuana use was significantly associated with an increase in odds of reporting <u>opioid dependence</u>, and past-year <u>non-medical use</u> <u>opioids</u> (Ramadan, 2020)

https://www.tandfonline.com/doi/full/10.1080/10550887.2020.1816117



- lacksquarereported authorization from a **health professional**
 - Medical users modally reported daily use •
 - trauma)
 - exclusive medical use was less common (19.3%)

/reader/sd/pii/S0010440X20300304?token=ADD81539294C448801520F642E22CC784FE39F6711FABD64204D0616210D1F9C3AF71188EF53

2020, October, Turna; Comprehensive Psychiatry; Of all medical users, only **<u>23.4</u>%**

Compared to recreational users, medical users reported more problematic cannabis use in addition to greater psychiatric symptomatology (anxiety, depression and

• A large majority of medical users also reported using recreationally (80.6%), while



IASP/ANZCA

- 2021, International Association for the Study of Pain \bullet
 - use of cannabis and cannabinoids for pain relief.
- 2021, Australian and New Zealand College of Anaesthetists, Faculty of Pain Medicine \bullet

07001?mkt_tok=NjgxLUZIRS00MjkAAAF-ZOn80Q54bTKbENgZ3CikwcGlDuzvbXB0sth7l0yLASDAqkmUhNSUWJMXyEsUCpb72qELLRWvatQr https://www.choosingwisely.org.au/recommendations/fpm6

Due to the lack of high-quality clinical evidence, IASP does not currently endorse general

The evidence available is either **unsupportive** of using cannabinoid products in chronic noncancer pain (CNCP), or is of such low quality that no valid scientific conclusion can be drawn





of Anesthetists, Faculty of Pain Medicine

https://www.apsoc.org.au/position-papers

Australian Pain Society

 Relies heavily on the International Association for the Study of Pain as well as the Australian and New Zealand College

New Zealand Pain Society

of Anesthetists, Faculty of Pain Medicine

https://www.apsoc.org.au/position-papers



 Relies heavily on the International Association for the Study of Pain as well as the Australian and New Zealand College

British Pain Society 2018

- Meta-analyses of clinical studies on cannabinoids for the management of pain conclude that there is <u>no positive evidence</u> to support routine use in pain management
 - These include neuropathic pain, chronic non-malignant pain and cancer pain
- The quality of some studies is <u>not of a high standard</u> and supports the need of welldesigned robust clinical trials
- More reliable evidence is warranted following robust clinical evaluation

tps://www.britishpainsociety.org/static/uploads/resources/files/BPS_Position_Statement_on_the_medicinal_use_of_cannabinoids_in_pain_management.p



European Pain Federation 2018

- content should be classified as 'cannabis-derived' or 'cannabis- based' medicines.
- medicines
- differ in their efficacy, tolerability and safety.
- **Do not prescribe** cannabis-based medicines to patients taking high doses of **opioids or** benzodiazepines.
- **Do not prescribe** cannabis flowers with a **high (>12.5%) THC content**

Registered medicinal cannabis extracts with **defined and standardized** THC and THC/CBD

• There are **differences** in the approval and availability of medical cannabis and cannabis-based

• There is **insufficient evidence** as to whether medical cannabis and cannabis-based medicines

https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/ejp.1297

National Institute on Health Care and Excellence **United Kingdom, Nov 2019**

- Do not offer the following to manage chronic pain in adults:
 - Nabilone
 - Dronabinol
 - THC (delta-9-tetrahydrocannabinol)
 - a combination of cannabidiol with THC
- clinical trial.

https://www.nice.org.uk/guidance/ng144/resources/cannabisbased-medicinal-products-pdf-66141779817157

Do not offer CBD to manage chronic pain in adults unless as part of a

<u>coloradohealthinstitute.org</u>

Colorado Health Institute Opioid Overdose Deaths by County 2002-2014

Colorado Drug Overdose Death Rate, 2002










Reductions in opioid prescribing have not led to reductions in drug-related mortality

Overdose deaths: 94,134*

Opioid prescriptions: 143,390,951¹

(44.4% decrease since 2011)



*Provisional data for the 12-month period Jan. 2020–Jan. 2021 https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

https://m365-emarketing-uploads.s3.amazonaws.com/images/trial_4d789c7ac246ab97/AMA-2021-Overdose-Epidemic-Report_92021.pdf









https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

Drug overdose deaths up slightly after big jumps during pandemic

Predicted counts of drug overdose deaths for the 12-month period ending with each month.



	COV	D-19 pandemic dec	lared	
2019	2020	2021	2022	202
				/

https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm





2019 data shows a **24% increase** (433 total) in prescription opioid overdose deaths and **115% increase** (220 total) in fentanyl deaths



Number of drug overdose deaths by substances mentioned: Colorado residents, 2000-2020 798 Any opioid analgesic (natural, synthetic, methadone; mention of T40.2-T40.4)) 540 Methamphetamine (mention of T43.6, "Psychostimulants with abuse potential") - 525 Heroin (T40.1) Cocaine (T40.5) 220 Fentanyl (T40.4, specific 219 mention of "fentanyl")

Drug overdose deaths by category of specific drug involvement: 1,200 Any opioid analgesic (natural, semi- or fully-synthetic, methadone; mention of T40.2-T40.4, may include fentanyl) Heroin (T40.1) Methamphetamine (mention of T43.6, "Psychostimulants with abuse potential") -Cocaine (T40.5) Fentanyl (T40.4, specific mention of "fentanyl") Number of deaths 92





Deaths involving more than one substance will be counted in each respective category. Source: Vital Statistics Program, Colorado Department of Public Health and Environment.





Canadian OD data

Canada's MJ legalization has not curbed its opioid crisis

24.6% increase in one year (2020-2021)

104% increase from the year prior to legalization (2017).

Province or territory	
BC	
AB	
SK	
MB	
ON	
QC	
NB	
NS	
PE	
NL	
ΥT	
NT	
NU	
Canada	

22

2019			2020			2021		
Number	Crude rate per 100,000 population	Age-adjusted rate per 100,000 population	Number	Crude rate per 100,000 population	Age-adjusted rate per 100,000 population	Number	Crude rate per 100,000 population	Age-adjus rate pe 100,000 populatio
1,020	20.0	19.9	1,794	34.8	34.8	2,333	44.8	44.8
626	14.3	14.1	1,184	26.8	26.6	1,621	36.5	36.0
117	10.0	10.6	268	22.7	23.8	331	28.0	29.8
62	4.5	4.6	260	18.8	19.3	260	18.7	19.1
1,558	10.7	10.8	2,461	16.7	16.8	2,864	19.3	19.5
208	2.4	2.5	316	3.7	3.7	450	5.2	5.3
35	4.5	4.6	45	5.7	5.9	44	5.6	5.8
57	5.9	5.9	50	5.1	5.3	39	3.9	4.0
5	3.2	3.3	8	5.0	4.9	12	7.3	8.2
18	3.4	3.5	24	4.6	4.9	25	4.8	5.2
4	9.7	10.0	10	23.7	23.3	23	53.2	49.6
1	2.2	2.1	3	6.6	5.8	4	8.8	8.0
Suppr.	Suppr.	Suppr.	Suppr.	Suppr.	Suppr.	Suppr.	Suppr.	Suppr.
3,711	9.9	10.0	6,423	16.9	17.1	8,006	20.9	21.2

https://health-infobase.canada.ca/substance-related-harms/opioids-stimulants/







Annual drug overdose deaths in Oregon

1,500 deaths



Source: C.D.C. | Chart shows provisional numbers. | By The New York Times

Oregon OD Data

Cocaine-Induced Endocannabinoid Release

- 2013; Addiction Biology
 - earliest stage of cocaine use
 - disorders

Results suggest that endocannabinoids play a primary role from the

 Mediates the inception of long-term brain-adaptive responses, shaping central pathways and likely increasing vulnerability to stimulant abuse

https://pubmed.ncbi.nlm.nih.gov/23910902/

D.C. Medical Cannabis Patient Growth





https://www.marijuanamoment.net/d-c-medical-marijuana-patient-registrations-surge-again-in-september-with-self-certification-law-in-effect/



Cannabis and Opioid Relationship

- April 22, 2022, (Bleyer, Barnes, Finn)
 - and mortality.

 - fentanyl subgroup

https://www.sciencedirect.com/science/article/pii/S0027968422000529?dgcid=coauthor

One reason is to expect marijuana to help reduce <u>opioid dependence</u>

Opioid <u>deaths have increased</u> more where marijuana was legalized

This correlation is highly statistically significant for all opioids and



Marijuana and the Opioid Epidemic

- February, 2023; Journal of Health Economics

https://www.sciencedirect.com/science/article/pii/S016762962300005X?via=ihub

Legal medical marijuana, particularly when available through retail dispensaries, is associated with higher opioid mortality.

Marijuana and the Opioid Epidemic

- November, 2022; JAMA
- Meta-analysis of 20 studies
- Cannabis <u>no better than placebo</u> in treatment of pain

.com/journals/jamanetworkopen/fullarticle/2799017?utm source=For The Media&utm medium=referral&utm campaign=ftm links&utm term=1



Cannabis Laws and Impacts on Pain

- June 2023; Annals of Internal Medicine
 - chronic noncancer pain
 - pain medication, or any <u>chronic pain procedure</u>

https://pubmed.ncbi.nlm.nih.gov/37399549/

 This study did not identify <u>important effects</u> of medical cannabis laws on receipt of opioid or nonopioid pain treatment among patients with

No impact on any <u>opioid prescribing</u>, any <u>non-opioid prescribing</u>

Cannabis and Cannabinoids for Pain and Posttraumatic Stress Disorder in **Military Personnel and Veterans**

- July 2023; JAMA Psychiatry
- A meta-analysis of 36 randomized clinical trials (RCTs) studying benefit
- veterans

cannabinoids for pain management found that most trials showed no

The current body of evidence does not support the use of cannabis or cannabinoids for the treatment of pain or PTSD in military personnel or

https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2806886

Perioperative Cannabis Use

- March/April 2021; Spine Line
- need to be thoroughly evaluated prior to surgery.

https://www.spineline-digital.org/spineline/library/item/march_april_2021/3913744/

• Patients who are using cannabinoids, either medicinally or recreationally,

ASRA

- May 2023; Regional Anesthesia and Pain Medicine
- Cannabinoid use in the peri-operative period may have significant potential negative implications

https://pubmed.ncbi.nlm.nih.gov/36596580/

Cannabis Use and Perioperative Complications

- July 2023; JAMA Surgery
 - cardiac surgery.

https://pubmed.ncbi.nlm.nih.gov/37405729/

Cannabis use disorder is associated with increased risk of patient morbidity and in-hospital mortality after major elective, inpatient, non-

Medical marijuana access and prolonged opioid use among adolescents and young adults

- June 2023
- Focusing on adolescents and young adults
- medical marijuana

This particularly vulnerable population does not exhibit reductions in prolonged use of opioids after surgery when they have legal access to

https://onlinelibrary.wiley.com/doi/10.1111/ajad.13440

- There is <u>no evidence</u> supporting the use of <u>dispensary</u> cannabis for chronic non-cancer pain
- There is <u>no evidence</u> for substituting opioids with <u>dispensary</u> cannabis
- There is no package insert for dispensary cannabis
- Cannabis users are more likely to develop opioid use disorder or misuse their opioids and have higher depression and anxiety scores, and other negative psychiatric effects
- States with medical marijuana programs typically have <u>higher opioid overdose deaths</u> than non-medical marijuana states
- Any real or perceived benefit <u>outweighed</u> by current evidence

Cannabis and Opioids

Pregnancy/In Utero Exposure





Used with permission, Fremont County Sheriff



Pregnancy/In Utero Exposure

 More than 70% of surveyed dispensaries in Colorado recommended cannabis use during first trimester pregnancy

https://pubmed.ncbi.nlm.nih.gov/29742676/)

- THC may persist in breast milk for up to 6 weeks after cessation https://jamanetwork.com/journals/jamapediatrics/article-abstract/2776975
- Prenatal marijuana <u>exposure impacts executive functioning</u> into young adulthood: An fMRI study (<u>https://pubmed.ncbi.nlm.nih.gov/27263090/</u>)





SAMHSA, January 2023

Year	Near Daily Use	First Trimester Pregnancy	Second Trimester Pregnancy	Third Trimester Pregnancy	Total Pregnancy
2002	2.00%	2.09%	0.61%	0.77%	3.47%
2006	2.08%	0.41%	2.41%	0.96%	3.78%
2010	2.77%	2.94%	0.16%	0.33%	3.43%
2015	3.43%	0.43%	1.33%	0.26%	2.02%
2018	4.34%	2.82%	1.22%	1.81%	5.85%
2020	5.31%	3.54%	3.40%	0.01%	6.95%
Year	Near Daily Use	First Trimester Pregnancy	Second Trimester Pregnancy	Third Trimester Pregnancy	Total Pregnancy
2002	2.00%	2.09%	0.61%	0.77%	3.47%
2006	2.08%	0.41%	2.41%	0.96%	3.78%
2010	2.77%	2.94%	0.16%	0.33%	3.43%
2015	3.43%	0.43%	1.33%	0.26%	2.02%
2018	4.34%	2.82%	1.22%	1.81%	5.85%
2020	5.31%	3.54%	3.40%	0.01%	6.95%
			D 1 1	T ()	
			Period	Interval	Rise
			Period 1	Interval 2002-2010	Rise 0.99

https://pdas.samhsa.gov/#/



In Utero Exposures, Connecticut September 2022

- 4,700 notifications over 28 months
 - 79% included marijuana exposure
 - 21% included opioid exposure
 - < 3% included alcohol exposure

https://publications.aap.org/hospitalpediatrics/article/doi/10.1542/hpeds.2022-006562/189477/Novel-Implementation-



Associations Between Prenatal Cannabis Exposure and Childhood Outcomes; Results From the ABCD Study September 2020

- N=11,875, <u>ages 9-11</u>
- Cannabis exposure only, before and after maternal knowledge of pregnancy, were associated with greater offspring **psychopathology** characteristics
- social problems
- greater risk for **psychopathology** during middle childhood.

 Exposure after maternal knowledge of pregnancy remained associated with greater **psychotic-like experiences**, attention, thought, and

Prenatal cannabis exposure and its correlated factors are associated with

https://pubmed.ncbi.nlm.nih.gov/32965490/



Prenatal cannabis exposure associated with mental disorders in children that persist into early adolescence

- National Institute of Health, NIDA
- September 2022
- Associated with attention, social, and behavioral problems which persist into early adolescence
- The ABCD study tracked **12,000 youths**

https://nida.nih.gov/news-events/news-releases/2022/09/prenatal-cannabis-exposure-associated-with-me



Characteristics Associated With Cannabis Use Initiation by Late Childhood and Early Adolescence in the Adolescent Brain Cognitive Development (ABCD) Study

- June 2023
- Prenatal cannabis exposure was associated with the <u>largest risk for</u> <u>cannabis use initiation</u>
- This <u>association remained</u> when additionally controlling for alcohol and tobacco use initiation, family or parent alcohol or drug problems, and prenatal alcohol and tobacco exposure



Figure. Variables Associated With Cannabis Initiation as Children Enter Early Adolescence

ari	able
Pr	enatal cannabis exposure ^a
Pa	arent with drug or alcohol problem ^a
U	PPS-P sensation seeking ^a
U	PPS-P lack of planning ^a
BI	S/BAS fun seeking ^a
C	3CL total problems ^a
C	BCL externalizing factor ^a
C	3CL rule-breaking behavior ^a
C	BCL aggressive behavior ^a
C	3CL attention problems ^a
C	3CL internalizing factor ^a
C	3CL withdrawn/depression ^a
C	3CL somatic complaints ^a
C	3CL social problems ^a
C	3CL thought problems ^a
K	SADS-5 past/current anhedonia ^a
K	SADS-5 past/current depressed mood ^a
Ea	ase of obtaining cannabis ^b
M	EEQ-B positive expectancies ^b
N	o. of friends currently using cannabis ^b
Pe	eer tolerance of cannabis use – once or twice ^b
Pe	er tolerance of cannabis use – occasionally ^b
Pe	er tolerance of cannabis use – regularly ^b
In	tention to use cannabis - curious about using ^b
In	tention to use cannabis - intending to use soon ^b
In	tention to use cannabis - if offered by best friend ^b
Pe	erceived harm of cannabis use - once or twice ^b
Pe	erceived harm of cannabis use - occasionally ^b
Pe	erceived harm of cannabis use - regularly ^b




Pregnancy/In Utero Exposure

- Evidence for adverse effects of paternal THC administration on neurodevelopment in the offspring https://academic.oup.com/toxsci/article/174/2/210/5741194/
 - Impact on behavior, attention, and reward
- A longitudinal study of the impact of marijuana on adult memory function: Prenatal, adolescent, and young adult exposures, https://pubmed.ncbi.nlm.nih.gov/33524507/

 - First trimester marijuana exposure indirectly predicted young adult memory. • Early onset marijuana use predicted increased memory deficits in young adulthood.





Cannabis use during pregnancy could cause "lifelong cognitive deficits"

- August 2023
- cognitive and memory functions.
- and adolescent neurodevelopment, as well as cognitive and emotional processing.
- "Lifelong cognitive deficits"

• Prenatal exposure to cannabis in rats led to lasting, substantial effects on

• THC disrupts the fetal endocannabinoid system (ECS), a key player in fetal



Pregnancy/In Utero Exposure

- January, 2023
- of pregnancy.

• Early pregnancy cannabis exposure and adverse pregnancy outcomes Cannabis exposure was associated with small for gestational age, medically indicated preterm birth, stillbirth, or hypertensive disorders



The impact of timing of in utero marijuana exposure on fetal growth

- May 2023; Frontiers in Pediatrics
 - Marijuana use <u>throughout gestation</u> predicted significant deficits in birth weight and head circumference at delivery
 - Marijuana use during the <u>first trimester</u> resulted in significant deficits in <u>newborn weight</u>
 - Low birth weight and decreased head circumference are associated with neurological and psychological issues, health complications in childhood



Maternal cannabis use in pregnancy and child neurodevelopmental outcomes, August 2020

- Cannabis use in pregnancy was linked to an increased risk of preterm birth
- only cannabis during pregnancy, and no other substances.
 - compared to those who did not use cannabis.

• Researchers specifically looked at 2,200 women who reported using

Babies born to this group still had an increased risk of autism



https://pubmed.ncbi.nlm.nih.gov/32778828/

Autism link

- July 2023
- Prenatal delta-9-tetrahydrocannabinol exposure is associated with changes in **DNA methylation** enriched for **autism genes**
- longer-term offspring outcomes

https://pubmed.ncbi.nlm.nih.gov/37415206/

Prenatal THC exposure alters placental and fetal DNA methylation at genes involved in **neurobehavioral development** that may influence



Cannabis Use and Perinatal Health Research

- August 2023
- Recent data showing that <u>paternal cannabis use</u> preconception may also <u>adversely affect reproductive health and offspring outcomes</u>, including lower infant birth weight, higher risk of spontaneous abortion, and sudden infant death syndrome
- Δ⁹ THC–induced changes in placental and fetal DNA methylation were in genes involved in neurodevelopment and <u>autism spectrum</u> <u>disorder</u>

?guestAccessKey=ba2843a9-18d7-429a-99d0-31d4a562b474&utm_source=silverchair&utm_medium=email&utm_campaign=article_alert-jama&



Figure. Effect of Paternal or Maternal Cannabis Use on Placental, Fetal, and Offspring Outcomes

Effects of cannabis use on:				
	Placenta	Fetus	Offspring	
Paternal cannabis use		 Spontaneous abortion Low birth weight 	 Small for gestational age Sudden infant death syndrome 	
<section-header></section-header>	 Altered placental epigenome and transcriptome 	 Preterm birth Low birth weight Altered fetal epigenome 	 Small for gestational age NICU admission Autism spectrum disorder Attention-deficit/hyperactivity diso Psychoticlike experiences 	





Perinatal Cannabis Use: A Clinical Review

- May 2023; Advances in Psychiatry and Behavioral Health
 - The prevalence of cannabis use in women of childbearing age is increasing drastically in the United States.
 - Cannabis <u>use during pregnancy</u> is likely associated with preterm birth, low birth weight, and long-term neuropsychiatric outcomes
 - Important to identify co-occurring mental health disorders and ensure adequate treatment during pregnancy and postpartum





Cannabis-Involved Pregnancy Hospitalizations March 2022

- hospitalizations
- involved pregnancy hospitalizations between 2011 and 2018
- Recreational market <u>may influence cannabis use</u> among pregnant individuals

https://www.sciencedirect.com/science/article/abs/pii/S009174352200041X?via=ihub

Increasing recreational dispensaries were associated with increases in

In Colorado, there was more than a two-fold increase in cannabis-



Cannabis-Involved Pregnancy Hospitalizations Canada

- May 2023; Canadian Medical Association Journal
 - The rate of <u>acute care for cannabis use during pregnancy</u> increased from 11.0 per 100,000 pregnancies before legalization to 20.0 per 100,000 pregnancies after legalization
 - Pregnancies with acute care for cannabis use had greater odds of newborns being born <u>preterm</u> and of <u>requiring care in the neonatal</u> <u>intensive care unit</u> than those without acute care for cannabis use.





https://www.the-scientist.com/infographics/infographic--how-exposure-to-cannabis-in-utero-affects-development-65266





years (Including All Sexes), Colorado 2010 to 2020



Figure 3: Annual Marijuana Only Cases by Exposure Reason and Ages 0-5 years & 13-19

https://marijuanahealthinfo.colorado.gov/health-data/poison-center-data

Pediatric Edible Cannabis Exposures and Acute Toxicity: 2017–2021

- January 2023; American Academy of Pediatrics
 - In 2017, there were 207 reported cases, and in 2021 there were 3054 cases, an increase of 1,375.0%.
 - Seventy percent of cases followed to a known outcome were reported to have <u>central nervous system depression</u>
 - 22.7% of patients were admitted to the hospital

https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2022-057761/190427/Pediatric-Edible-Cannabis-Exposures-and-Acute?autologincheck=redirected



From: Pediatric Edible Cannabis Exposures and Acute Toxicity: 2017–2021



DEDICATED TO THE HEALTH OF ALL CHILDREN®

Pediatrics. Published online January 03, 2023. doi:10.1542/peds.2022-057761



Figure Legend:

Pediatric edible cannabis product ingestions per 1000 pediatric calls to the National Poison Data System by year.

Recent Trends in Marijuana-Related Hospital Encounters in Young Children

- May 2022; Academic Pediatrics
 - Inpatient, emergency department and observation encounters for <u>children <6 years</u> with marijuana exposures unique on the patientyear level at <u>52 children's hospitals in the Pediatric Health</u> <u>Information System database</u> from 01/01/2004 to 12/31/2018
 - There was a 13.3-fold increase in exposures in 2018 compared to 2004
 - Fifty percent were inpatient (n = 645) and <u>15% required intensive</u> care with <u>4% requiring mechanical ventilation</u>









Adolescents and the Lung

- Monitoring the Future (2019)
 - Past 30-day <u>frequent cannabis use</u> with vaping and occasional use with vaping rose from 2017 to 2019
 - Adolescents who reported smoking and vaping nicotine were 42.28 and 10.09 times <u>more likely</u> to report <u>past 30-day cannabis use</u> with vaping
 - Cannabis use with vaping is <u>accelerating</u>; frequent cannabis vaping is especially increasing



Adolescent Vaping Nicotine and Cannabis use

- May 2023; Journal of Substance Use and Misuse
- of cannabis use and binge drinking, higher with cannabis

Table 2. Associations between past 30-day nicotine and past 30-day cannabis use among US adolescents, 2017–2019.

Exposure: Past 30-day nicotine use	Outcome: Past 30-day cannabis use	Odds ratio ^a	Lower 95% confidence interval limit	Upper 95% confidence interval limit
Smoking only (vs. no use)	Without vaping	7.01	5.43	9.03
Smoking only (vs. no use)	With vaping	8.03	5.75	11.23
Vaping only (vs. no use)	Without vaping	4.26	3.75	4.85
Vaping only (vs. no use)	With vaping	20.31	17.85	23.11
Smoking and vaping (vs. no use)	Without vaping	8.95	7.09	11.30
Smoking and vaping (vs. no use)	With vaping	40.10	31.62	50.86

^aAdjusted for grade, sex, race, parental education, urbanicity, binge drinking, and year.

Nicotine use patterns were strongly associated with greater likelihood





90% Drop In Underage Compliance Checks April 5, 2022

Marijuana Enforcement Division conducted just 80 underage compliance checks all of last year.

By comparison, the Liquor Enforcement Division conducted 2,400 checks

Liquor Enforcement Division not only conducted **25 times more** underage compliance checks last year, it did so with half as many full time employees

s://denver.cbslocal.com/2022/04/05/senators-tell-marijuana-enforcement-division-do-your-job-after-90-drop-in-underage-compliance-che







Teen visits to Emergency Departments increase post legalization with 71% for psychiatric events (Colorado, Wang, 2018)

G.S. Wang et al. / Journal of Adolescent Health 63 (2018) 239–241





Figure 1. Annual marijuana-related emergency department (ED) and urgent care (UC) visits from a tertiary care children's hospital in Colorado.



Adolescent Cannabis Use and Opioids

- March 29, 2021; JAMA Pediatrics
 - **17 yo)** had become **addicted** to it....within three years of first trying the drug, 20% of adolescents became addicted to it."
 - "Within a year of first trying marijuana, <u>10.7%</u> of adolescents (12-• Compared to opioids (11.2%, 10.6%)
 - At 3 years of first trying marijuana vs. opioids (12-17 yo), marijuana has a higher percentage of addiction



STUDY SUBJECTS (FIRST TIME USERS)



Heroin (18-25)

STUDY SUBJECTS (FIRST	ADDICTION RATE	ADDICTION RATE
TIME USERS)	AFTER 1 YEAR	AFTER 3 YEARS
Cannabis (age 12-17)	10.7%	20.1%
Cannabis (18-25)	6.4%	10.9%
Opioid (12-17)	11.2%	10.6%
Opioid (18-25)	6.9%	7.3%
Cocaine (18-25)	5.6%	6.4%
Heroin (18-25)	30.9%	42.5%

Early Onset Cannabis Use

- August 2023; JAMA Pediatrics
 - Development (ABCD) Study
 - cannabis use initiation
 - lems, and prenatal alcohol and tobacco exposure

 Characteristics Associated With Cannabis Use Initiation by Late Childhood and Early Adolescence in the Adolescent Brain Cognitive

• Prenatal cannabis exposure was associated with the largest risk for

 This association remained when additionally controlling for alcohol and to-bacco use initiation, family or parent alcohol or drug prob-





Figure. Variables Associated With Cannabis Initiation as Children Enter Early Adolescence

Variable
Prenatal cannabis exposure ^a
Parent with drug or alcohol problem ^a
UPPS-P sensation seeking ^a
UPPS-P lack of planning ^a
BIS/BAS fun seeking ^a
CBCL total problems ^a
CBCL externalizing factor ^a
CBCL rule-breaking behavior ^a
CBCL aggressive behavior ^a
CBCL attention problems ^a
CBCL internalizing factor ^a
CBCL withdrawn/depression ^a
CBCL somatic complaints ^a
CBCL social problems ^a
CBCL thought problems ^a
KSADS-5 past/current anhedonia ^a
KSADS-5 past/current depressed mood ^a
Ease of obtaining cannabis ^b
MEEQ-B positive expectancies ^b
No. of friends currently using cannabis ^b
Peer tolerance of cannabis use - once or twice ^b
Peer tolerance of cannabis use – occasionally ^b
Peer tolerance of cannabis use - regularly ^b
Intention to use cannabis - curious about using ^b
Intention to use cannabis - intending to use soon ^b
Intention to use cannabis - if offered by best friend ^b
Perceived harm of cannabis use - once or twice ^b
Perceived harm of cannabis use - occasionally ^b
Perceived harm of cannabis use - regularly ^b





Cannabis Use and Depression

- JAMA Psychiatry, August 18, 2020
 - Adults 20-50 yo, N=16,216
 - cannabis use
 - of using cannabis compared with people without depression

https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2769386

Individuals with depression are at increasing risk of cannabis use, with a particularly strong increase in daily or near daily

Individuals with depression had approximately double the odds





Cannabis Use and Depression

- August 2023; Cureus
- A Scoping Review of Associations of Marijuana and Depression Consuming marijuana was linked to the <u>development of depression</u> in
- the majority of individuals
- Studies potentially point to a complicated causal relationship between marijuana consumption and depressive disorder

https://pubmed.ncbi.nlm.nih.gov/37664373/





Factors associated with suicide in people who use drugs: a scoping review

- September 2023; BMC Psychiatry

Opioids, followed by <u>cannabis and stimulant drugs</u> were the most prevalent drugs of use in people who use drugs who died by suicide.



https://pubmed.ncbi.nlm.nih.gov/37670233/

front Inemployed How long in this position?_ duties? ining alcohol in the past year? YES (NO do you have per week?_ Per Month? ve a drink, how many do you drink? Do you smoke everyday? YES (NO YES (NO lo you smoke your first Cigarette? smoking? YES M NO 'ES (NO How long ago did you quit? YES NO ? YES medicinal or recreational Circle one) How much? How Often? What Type? (Circle One) Smoke Edible Hash Oil is the most stressful thing in your life? house/going ner WING al Pr ease Circle One)

Cannabis Use Is Associated With Depression Severity and Suicidality

- Psychiatry
 - suicide attempt

• July 2023; Journal of the American Academy of Child and Adolescent

 Cannabis use is associated with higher odds of depression and depression severity in adolescence. Furthermore, depression and cannabis use are independently associated with higher odds of



https://pubmed.ncbi.nlm.nih.gov/37538853/

Self-Harm and Mortality Risk

- January 2021; JAMA Pediatrics
 - and **homicide** among youths with mood disorders
 - harm and all-cause mortality

https://jamanetwork.com/journals/jamapediatrics/article-abstract/2775255

Cannabis use disorder is a common comorbidity and risk marker for self-harm, all-cause mortality, and death by unintentional overdose

Cannabis use disorder was significantly associated with nonfatal self-



Suicidality

- March 2021: American Academy of Pediatrics

 - Adolescent marijuana use -> opioid misuse -> suicidality

https://pediatrics.aappublications.org/content/early/2021/02/25/peds.2020-030601

Current adolescent prescription opioid misuse is associated with increases in the risk for suicide-related behaviors



Suicide in Colorado: Circumstances, Toxicology, and Injury Location, 2020, includes Race/Hispanic Origin Colorado Violent Death Reporting System

County of residence:	Sex:			
(All)	- (All)			
Education:	Marital status:			
(All)	- (All)			

Method used to inflict the fatal injury: (All)

Total suicides entire state: 1,275

For all charts below: the bars represent the values for selected population, the yellow reference bands are the values for the entire

Entire state:

1+ circumstance:	1,235
No circumstance	40

1+ circumstance:	7
No circumstance	1





82 Total suicides selected population:

he.state.co.us/t/HealthInformaticsPublic/views/COVDRSSuicideDashboardSingleRaceandMultipleRace/Story1?:embed=y&:iid=1&:isGuestRedire



Suicide in Colorado: Circ Location, 2020-2021, in Colorado Violent Death Rep	c umstar cludes orting Sy	ces, Toxicolog Race/Hispanic (/stem	/, and Injury Origin	Selection 202	ct Year:	2021
County of residence:		Sex:	Age:	Race:		Hispanic Origin:
Education:	Marital	status:		(All)	Veteran status (ever in	U.S. Armed Forces):
Method used to inflict the fatal i (All)	njury:				not a veteran	
Total suicides entire state:	1,352		Total suicide	es seled	cted population:	71

lotal suicides entire state: 1,352

For all charts below: the bars represent the values for selected population, the yellow reference bands are the values for the entire

Circumstances

Entire state:

1+ circumstance: 1,312 No circumstance 40

Selected population:

1+ circumstances 69 No circumstance

42.0%








residents younger than 25 years (population of interest), 2010-2022[‡]

Toxicology result	Frequency	Percent (%) (n=2,233)
Toxicology test results available	2,223	
No substance	713	31.9%
Marijuana present	651	29.2%
Alcohol present	560	25.1%
Opioid present	558	25.0%
Amphetamine present	255	11.4%
Cocaine present	254	11.4%
Benzodiazepines present	185	8.3%
Antidepressant present	180	8.1%
Anticonvulsants present	72	3.2%
Antipsychotic present	51	2.3%
Carbon monoxide present	38	1.7%
Muscle relaxant present	9	0.4%
Barbiturates present	6	0.3%

https://drive.google.com/drive/u/0/folders/1K0jYw-3spzb6F3OTOw1JLupdMK4Z5mfH

Table 3. Toxicology test results among non-natural, non-homicide deaths, Colorado

Youth Suicide Risk, Guns, and Cannabis Use Intersection

TABLE 5. Adjusted prevalence ratios for suicide risk and substance use behavior, by gun carrying — Youth Risk Behavior Survey, United States, 2021*

Risk/Behavior

Suicide risk

Seriously considered attempting suicide[§]

Attempted suicide[§]

Substance use

Current binge drinking[¶]

Current marijuana use**

Lifetime prescription drug misuse

Lifetime illicit drug use^{††}

https://www.cdc.gov/mmwr/volumes/72/su/su7201a3.htm?s_cid=su7201a3_w#T3_down

No, gun carrying % (95% CI)	Yes, gun carrying % (95% CI)	aPR [†] (95% CI)
21.7 (20.7–22.9)	40.2 (35.2-45.5)	2.0 (1.8–2.3)
93(85-101)	36 4 (30 1-43 2)	37(31-45)
5.5 (0.5 10.1)	50.4 (50.1 45.2)	5.7 (5.1 4.5)
9.7 (8.7–10.9)	38.2 (30.5–46.7)	3.9 (3.1–4.8)
14.8 (13.3–16.4)	51.2 (42.8–59.5)	3.3 (2.8–3.9)
11.2 (10.4–12.1)	43.5 (36.5–50.9)	4.0 (3.2–5.0)
12.1 (11.1–13.2)	46.9 (41.6–52.2)	3.8 (3.2–4.5)

Youth Use and Suicide

- January 2023; Frontiers in Psychiatry
 - NSDUH data 2015-2019
 - Higher rates of suicidal behaviors among youth that used marijuana in the past-year compared to youth that did not
 - Youth with a marijuana use disorder had higher rates of any suicide ideation (62.4%), any suicide plan (58.3%), and any suicide attempt (43.8%).



Links Between Alcohol and Cannabis Use on the Transition From Suicidal Ideation to Attempts

- May 2023; Archives of Suicide Research
 - <u>Cannabis use</u> was associated with <u>increased risk</u> of transitioning from suicidal ideation to making a suicide attempt
 - <u>No association</u> was found for alcohol



Association Between Marijuana Laws and Suicide Among 12- to 25-Year-Olds in the United States From 2000 to 2019

- Psychiatry
 - mortality in female youth
 - compared to states with MML and states without ML

July 2023; Journal of the American Academy of Child and Adolescent

MML and RML were associated with increased suicide-related

Youth aged 14-16 had <u>higher rates of suicide</u> in states with RML



https://www.jaacap.org/article/S0890-8567(23)00341-6/fulltext

CO Youth Outcomes

- January, 2023; CO Health Outcomes Report
 - Patients aged 13-17 had the <u>highest discharge rate</u> due to marijuana of any age group from both emergency departments and hospitals
 - Based on diagnostic codes <u>including</u> cannabis poisoning and cannabis abuse, dependence, or intoxication

://drive.google.com/file/d/1HVWIBPwFXwpEVIYYgFzkmnjJdT_VMb7h/view?eType=EmailBlastContent&eId=1d276abe-a130-4c30-890f 4c544a97



Nondisordered Cannabis Use Among US Adolescents

- May 3, 2023; JAMA

 - CUD
 - ALL adverse psychosocial events examined, including major depression, suicidal ideation, slower thoughts, difficulty aggression

 Nondisordered cannabis use in adolesents (non-CUD, subclinical) Past-year NDCU was approximately <u>4 times as prevalent</u> as past-year

 Individuals with NDCU had approximately <u>2 to 4 times greater odds of</u> concentrating, truancy, low grade point average, arrest, fighting, and





Youth Use and Psychosis

- January 2023; CDPHE
 - Frequent marijuana use by Colorado youths associated with psychotic disorders
 - schizophrenia in adulthood.
 - These symptoms are worse with higher doses

https://drive.google.com/drive/u/0/folders/1K0jYw-3spzb6F3OTOw1JLupdMK4Z5mfH?eType=EmailBlastContent&eId=67be25d9-9558-4eea-ac83f8a8a2b3a382

 <u>Daily or near-daily marijuana use</u> by adolescents and young adults is strongly associated with developing a psychotic disorder such as



Interpersonal Abuse and Cannabis Use on Psychotic Experiences

- April 24, 2023; Social Psychiatry and Psychiatric Epidemiology
- Students who <u>only</u> used cannabis had significantly greater odds of <u>psychotic experiences</u> as well as those who <u>only</u> experienced interpersonal abuse
- Those who reported both cannabis use <u>and</u> interpersonal abuse had the greatest odds, <u>exceeding the sum</u> of these individual effects



Association between reasons for first using cannabis, later pattern of use, and risk of first-episode psychosis

- May 2, 2023; Psychological Medicine
 - Cannabis use is a well-established risk factor for psychosis
 - People who reported their reason for first using cannabis to 'feel better' were <u>more likely to progress to heavy use</u> and <u>develop a</u> <u>psychotic disorder</u> than those reporting 'because of friends'.



CUD and Schizophrenia

- June 2023; Acta Psychiatrisa Scandanavica
- Does a history of cannabis use influence onset and course of schizophrenia?
- cannabis during adolescence

• The disease **burden of schizophrenia** is greater in individuals who use



https://pubmed.ncbi.nlm.nih.gov/37094811/

CUD and Schizophrenia

- Medicine
 - developing <u>schizophrenia</u>
 - cannabis use disorder
 - representing more than <u>6 million people</u> in Denmark

https://nida.nih.gov/news-events/news-releases/2023/05/young-men-at-highest-risk-schizophrenia-linked-with-cannabis-use-disorder https://www.cambridge.org/core/journals/psychological-medicine/article/association-between-cannabis-use-disorder-and-schizor previous and the second stronger-in-young-males-than-in-females/E1F8F0E09C6541CB8529A326C3641A68

• May 4, 2023, National Institute of Drug Abuse (NIDA); Psychological

Young men with <u>cannabis use disorder</u> have an increased risk of

• Authors estimated that as many as **30% of cases of schizophrenia** among men aged 21-30 might have been prevented by averting

Analyzed detailed health records data spanning <u>5 decades</u> and





PARF=Population attributable risk fraction. Modeled PARF= PARF results from the selected joinpoint regression model. APC=annual percentage change. AAPC=average APC during 1972-2021. APC=AAPC: Indicate that no joinpoints were identified using Bayesian Information Criterion.

ge-core/content/view/E1F8F0E09C6541CB8529A326C3641A68/S0033291723000880a.pdf/association-between-cannabis-use-disorder-and-schized and schized and set and s



A Few Other Medical Impacts

- July 2022; Addiction Journal
 - adults
 - that persisted after intoxication passed
 - making.

Brain

Acute and residual neurocognitive effects of cannabis use in adolescents and

Verbal learning and memory were most impaired by acute cannabis intoxication

Small-to-moderate deficits were reported for working memory and decision-

Cannabis administration induced small-to-moderate adverse effects and residual

https://pubmed.ncbi.nlm.nih.gov/35048456/



Long-Term Cannabis Use and Cognitive Reserves and Hippocampal **Volume in Midlife**

- March 2022; American Journal of Psychiatry
 - Representative co- hort of <u>1,037 individuals</u> born in Dunedin, New Zealand, in 1972–1973 and followed to age 45
 - 94% retention
 - Long-term cannabis users showed <u>IQ decline</u> from childhood to midlife (mean 5.5 IQ points), poorer learning and processing speed relative to their childhood IQ
 - Long-term cannabis users showed smaller hippocampal volume



https://ajp.psychiatryonline.org/doi/10.1176/appi.ajp.2021.21060664

- March 2023; JAMA Psychiatry
- Administration, 2005 to 2019
- prevalence, particularly in older patients.

 - Results underscore the need to screen

Brain

State Cannabis Legalization and Cannabis Use Disorder in the US Veterans Health

MCL and RCL enactment played a significant role in the overall increases in CUD

Consistent with general population studies, effect sizes were relatively small

Other factors may played a larger role in the overall increases in adult CUD









https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000883

Heart

Cardiovascular Effects

- Medical cannabis users had a <u>74% higher risk</u> of heart rhythm problems
- pre-mature atrial contractions/hour, and more non-sustained

9149(22)00541-0/fulltex



disorders compared with non-users; Aug 2022 (<u>https://www.escardio.org/The-</u> ESC/Press-Office/Press-releases/Cannabis-prescribed-for-pain-linked-with-small-risk-of-heart-

Cannabis users had more <u>supraventricular tachycardia/day</u>, more

ventricular tachycaridia/day; Aug 2022 (<u>https://www.ajconline.org/article/S0002-</u>





Cardiovascular Effects

 Long-term use of electronic cigarettes, or vaping products, can <u>significantly impair</u> the function of the body's blood vessels, increasing the <u>risk for cardiovascular</u> <u>disease</u>; Nov 2022

(https://www.nhlbi.nih.gov/news/2022/nih -funded-studies-show-damaging-effectsvaping-smoking-blood-vessels)

 Chronic E-Cigarette Use <u>Impairs</u> Endothelial Function on the Physiological and Cellular Levels; Nov 2022 (<u>https://www.ahajournals.org/doi/full/10.1</u> <u>161/ATVBAHA.121.317749</u>)



Cardiovascular Effects

American College of Cardiology, February 2023 with people who have never used the drug

> https://www.acc.org/About-ACC/Press-Releases/2023/02/23/18/53/Frequent-Marijuana-Use-Linked-to-Heart-Disease#.Y zfjvkhWns.twitter



People who used marijuana daily were found to be about one-third more likely to develop coronary artery disease (CAD) compared





Peripheral Vascular Disease

- May 2023
- Marijuana users' risk of developing peripheral artery disease (PAD) was 3.68 times greater than that of nonusers.
- PAD at a young age could precede worse outcomes later in life
- Study used data on 623,768 marijuana users from the National Inpatient Sample
- Marijuana is known to be a cause of **thromboangiitis obliterans**, which is in the PAD family
- Presented the results at the Society for Cardiovascular Angiography & Interventions annual scientific sessions.



/www.mdedge.com/cardiology/article/263124/interventional-cardiology-surgery/marijuana-linked-higher-pad-risk?icd=login_success_email_match



Prevalence and impact of recreational drug use in patients with acute cardiovascular events

- August 2023
- Patients who used recreational drugs exhibited a higher major adverse event rate than others
- Recreational drugs were associated with a higher rate of in-hospital major adverse events after adjustment for co-morbidities
- Of 1499 consecutive patients, 161 (11%) had a positive test for recreational drugs (cannabis 9.1%, opioids 2.1%, cocaine 1.7%, amphetamines 0.7%, MDMA 0.6%).





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

- January 2023; Journal of American Geriatrics Society
- 2005-2019
- \geq 65 and all subgroups (65-74, 75-84, >85)
- per 100,000 ED visits in 2019, a **1,804% relative increase**

https://agsjournals.onlinelibrary.wiley.com/doi/abs/10.1111/jgs.18180

Cannabis-related ED visit rate increased significantly for adults aged

• Overall rate increased from 20.7 per 100,000 visits in 2005 to 395.0







Having Conversations with your Patients

- 2023; Finn, International Journal of Legal Medicine
- Cannabis must be treated like any other <u>centrally acting substance</u>, regardless of whether it is used medically or recreationally
- This is to approximate a <u>standard of care</u> expected of traditional medicine, which may reduce or avoid criminal or civil litigation against medical providers.



https://link.springer.com/article/10.1007/s00414-023-03041-x

Action Plan

- Cannabis is not a medication. Cannabis is a plant \bullet
- Support drug-development process for cannabinoids, including evidence-based dosing guidelines of cannabis-based medications
- Support potency cap (10% THC?)
- Eliminate home grows: breeding ground for illegal activity \bullet
- Track, monitor, and document public health impact (health care utilization, ER, birth \bullet defects, etc)
- Monitor and publish environmental impacts





Action Plan

- Monitor adolescent use closely
- Discourage smoking and vaping (EVALI) \bullet
- Discourage use during pregnancy and lactation \bullet
- Drug testing/toxicology on all suicides, including adolescents
- Monitor marijuana-related driving fatalities

Mandatory drug testing for all violent crimes (cannabis induced psychosis)



Kenneth Finn Editor **Cannabis in Medicine**

An Evidence Based Approach

Legalization of marijuana is becoming increasingly prominent in the United States and around the world. While there is some discussion of the relationship between marijuana and overall health, a comprehensive resource that outlines the medical literature for several organ systems, as well as non-medical societal effects, has yet to be seen. While all physicians strive to practice evidence-based medicine, many clinicians aren't aware of the facts surrounding cannabis and are guided by public opinion.

This first of its kind book is a comprehensive compilation of multiple facets of cannabis recommendation, use and effects from a variety of different perspectives. Comprised of chapters dedicated to separate fields of medicine, this evidence-based guide outlines the current data, or lack thereof, as well as the need for further study. The book begins with a general overview of the neurobiology and pharmacology of THC and hemp. It then delves into various medical concerns that plague specific disciplines of medicine such as psychiatry, cardiology, gastrointestinal and neurology, among others. The end of the book focuses on non-medical concerns such as public health and safety, driving impairment and legal implications.

Comprised of case studies and meta-analyses, Cannabinoids in Medicine: An Evidence-Based Approach provides clinicians with a concise, evidence-based guide to various health concerns related to the use of marijuana. By addressing non-medical concerns, this book is also a useful resource for professionals working in the public health and legal fields.



Cannabis in Medicine



Cannabis in Medic

An Evidence Based Approach **Kenneth Finn** Editor









https://iasic1.org



