HOUSE HEALTH SUBCOMMITTEE ON HEALTHCARE
INFORMATIONAL MEETING ON LEGALIZING CANNABIS FOR ADULT USE
AGENDA

Wednesday, November 1st, 2023
10:00 A.M.
Room G-50, Irvis Office Building
Harrisburg, PA

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1. Call to Order

2. Attendance

Panel 1

Dr. Kent Vrana, Penn State College of Medicine
Jeff Hanley, Executive Director, Commonwealth Prevention Alliance

Panel 2

Amanda Reiman, PhD MSW
Chief Knowledge Officer at New Frontier Data/Founder at Personal Plants

Panel 3

Dr. Jonathan Caulkins,
Steve University Professor of Operations Research and Public Policy
Carnegie Mellon University, Heinz College

3. Adjournment

PennState Health

PennState College of Medicine

CONSIDERATIONS FOR LEGALIZATION OF RECREATIONAL MARIJUANA IN THE COMMONWEALTH OF PENNSYLVANIA

Testimony Provided to the

Pennsylvania House
Health Committee

Hearing on Legalizing Cannabis for Adult Use

Kent E. Vrana, PhD, FAAAS
Elliot S. Vesell Professor and Chair of Pharmacology
Director, PA-designated Medical Marijuana Academic Clinical Research Center
Penn State College of Medicine

November 1, 2023

CONSIDERATIONS FOR LEGALIZATION OF RECREATIONAL MARIJUANA IN THE COMMONWEALTH OF PENNSYLVANIA

Kent E. Vrana, PhD, FAAAS
Elliot S. Vesell Professor and Chair of Pharmacology
Director, PA-designated Medical Marijuana Academic Clinical Research Center
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Thank you, Chairs Krajewski and Schemel of the Subcommittee on Health Care, Chairman Frankel and Chairwoman Rapp of the House Health Committee, and members of the House Health Committee, for the invitation to participate in today's informational hearing on legalizing cannabis for adult use. By way of introduction, my name is Dr. Kent Vrana, and I have served as the Elliot S. Vesell Professor and Chair of the Department of Pharmacology for the past 20 years at the Penn State College of Medicine. I received a BS degree (with honors in biochemistry) from the University of Iowa, a PhD in Biochemistry from Louisiana State University Health Sciences Center and received postdoctoral training in embryology and molecular biology at the Carnegie Institution of Washington on the Johns Hopkins University campus in Baltimore. Following faculty positions at West Virginia University (5 years) and Wake Forest University (13 years), I came to Penn State to lead the Department of Pharmacology in 2004. I am an elected fellow of the American Association for the Advancement of Science (FAAAS) and a College of Medicine Distinguished educator. I have over 30 years of published experience in substance abuse research. I have published over 220 scientific articles and two textbooks and have been supported by the NIH for most of my 40-year academic career (NIGMS [General Medical Sciences], NIDA [Drug Abuse], NIAAA [Alcoholism and Alcohol Abuse] and NCCIH [Complementary and Integrative Health]). I am currently the founding director of the Pennsylvania-designated Medical Marijuana Academic Clinical Research Center (ACRC) at Penn State and receiving an unrestricted sponsored research agreement from Pennsylvania Options for Wellness (an approved Clinical Registrant). I have co-authored over 25 scientific articles on cannabis and cannabinoid compounds.

It is an honor to provide this testimony on legalizing recreational cannabis for adult use to the Committee and those present at this hearing. I share with you my personal and professional opinions and do not represent the positions of the Penn State University.

While, scientifically, I know that recreational cannabis is safer than alcohol, I am against recreational cannabis because:

a. We don't need another legalized abused substance.
b. Documented potential harm to young people (especially heavy use among adolescents).
c. Potential harms to the very young (e.g., toddlers that get into their parents' "gummies").
d. The clear harms of the extremely high THC-content products that have exploded in the last 20 years.

I am delighted to pursue these concerns in the Q&A, but would like to focus this presentation on ways that any recreational legislation might be crafted to protect the people of the Commonwealth.

1) Regulate production and sale. The Commonwealth has a network of grower-processors and dispensaries that effectively regulate the quality and content of the medical cannabis materials being sold. Act 16 (the PA Medical Marijuana Act of 2016) did a great job of controlling and documenting the composition of medical cannabis products. We need to know that there are no pesticides, organic solvents, or heavy metals as contaminants and no synthetic compound additives in the products (think fentanyl). The consumer needs to know what they are buying. This network could certainly be expanded to enhance scale, but there needs to be safety oversight and I think the state should control that. I know that there was discussion of

using the state liquor stores as outlets and this could easily be combined with the existing dispensaries.

2) Products should be grown and processed within the Commonwealth, not imported from states with too much capacity (in search of our money). This provides economic benefit to the Commonwealth and also helps insure composition and quality.

3) No synthetic products - period (this would include delta-8 THC; or the highly potent synthetic pharmaceutical-grade products known as "K2" or "spice" on the street). There has been an increase in the observation that marijuana is being adulterated with high potency synthetic cannabinoids (c.f., Monti et al., 2022) in pursuit of a greater "high". This adulteration can extend to other psychoactive synthetic compounds. It is important to realize that these are not derived from the cannabis plant, but are synthesized in a laboratory (esp. delta-8 THC which is synthesized by boiling CBD oil in acid and organic solvent). This also speaks to the importance of growing and processing products here in the Commonwealth where analytical procedures are already in place to monitor composition.

4) I believe the Commonwealth should regulate the concentration of materials that can be sold. When I was in college, marijuana had perhaps 4% THC content by weight. You can now buy product that is 30% THC by weight (and much higher levels in extracted and concentrated vape products). There has been a steady growth in the higher-and-higher THC concentrations in cannabis for decades (Cannabis Potency Data, 2022). How high a THC content is required for individuals wishing to get high? There is a downside to acute toxicity (there are rare, but documented effects) and enhanced impairment that I believe we could mitigate by limiting concentrations. Specifically, I would propose, as a starting point for discussion, limiting content to 25% THC in cannabis materials and 30% in extracted ("vape") product.

I base these recommendations on the following observations. In spite of a public perception that cannabis and THC are safe, they are not without risk and that risk increases with higher concentrations and/or frequency of use. For instance:

a) Cannabis CUD disorder (CUD) is defined as continued seeking and use of cannabis despite significant negative impact on one's life and health. A recent report suggests that CUD prevalence may be as high as 21% of individuals who use cannabis recreationally and/or for medical purposes (Lapham et al., 2023). The CUD was categorized as "moderate" to "severe" in 6.5% of the individuals studied. The risk of CUD is related to the strength of the products used and the frequency with which they are used. So, once again, how much THC is required for recreational use?

b) Heavy cannabis use in adolescence is associated with development of schizophrenia later in life. This has been known for decades and extensively reviewed (c.f., Malone et al., 2010; Godin and Shehata, 2022). Moreover, while most studies focus on adolescence, the frontal cortex of the brain (the seat of cognition, judgment, and abstract thinking) continues to develop until the mid-20s. Therefore, suggesting that legalized recreational use will be limited to those 21 and older may not protect younger adults. And, we know that alcohol is restricted to 21-years-old and beyond, yet it is widely used by teenagers. Moreover, the availability of unregulated concentrations of products may produce problems that we don't uncover for years to come.

c) Professor Deepak D'Souza (Yale University) has characterized a rare, but important syndrome known as cannabinoid-induced acute and persistent psychosis (CIAPP). In this situation, cannabinoids can induce clinically significant psychotic episodes immediately following exposure, that can persist well beyond the duration of intoxication (D'Souza et al., 2016) and that require clinical intervention. This is related to THC concentrations, especially in inexperienced cannabis users.

d) There is a well-documented medical condition known as cannabis hyperemesis syndrome (CHS) in which selected individuals experience uncontrolled vomiting in response to cannabis use. We have recently reported a case series of adolescents with CHS that required repeated hospitalizations (Nachnani et al., 2022). Once again, this is related to the concentration of THC and frequency of use.

5) I do not believe "edibles" – at least in form of candies, gummies, or snacks – should be marketed.

   a) There are simply too many examples of young children accessing their parents' materials with very harmful outcomes. Using the Colorado market as an example, from the year before the initiation of the state's medical marijuana program (2010) until 2021, there was a 7-fold increase in children with cannabis poisoning (Reported Marijuana Exposure in Colorado, 2023). Indeed, there was the first report of the death of a child in Virginia, this past year, as a result of acute cannabinoid toxicity (https://www.nbcwashington.com/news/local/virginia-mother-pleads-guilty-in-4-year-old-sons-death-from-thc-gummies/3365697/).

   b) In addition, these forms enable the discrete use of cannabis products in the workplace or while operating machinery and motor vehicles.

6) How will the state regulate impaired driving or use in the workplace? – this is not like alcohol where you can simply do a breathalyzer test. This is a big unknown, but must have been addressed in other states, so there should be guidance out there.

Thank you again for the opportunity to provide testimony to the House Health Committee. At this time, I would be pleased to address any questions.

REFERENCES

Cannabis Potency Data (2022) https://nida.nih.gov/research/research-data-measures-resources/cannabis-potency-data (November 23, 2022). [accessed 10-20-2023]

D'Souza DC, Radhakrishnan R, Sherif M, Cortes-Briones J, Cahill J, Gupta S, Skosnik PD, Ranganathan M. Cannabinoids and Psychosis. Curr Pharm Des. 2016;22(42):6380-6391. doi: 10.2174/1381612822666160826105628.PMID: 27568729

Godin SL, Shehata S. Adolescent cannabis use and later development of schizophrenia: An updated systematic review of longitudinal studies. J Clin Psychol. 2022 Jul;78(7):1331-1340. doi: 10.1002/jclp.23312. Epub 2022 Jan 11.PMID: 35018649

Lapham GT, Matson TE, Bobb JF, Luce C, Oliver MM, Hamilton LK, Bradley KA. Prevalence of Cannabis Use Disorder and Reasons for Use Among Adults in a US State Where Recreational Cannabis Use Is Legal. JAMA Netw Open. 2023 Aug 1;6(8):e2328934. doi: 10.1001/jamanetworkopen.2023.28934.PMID: 37642968

Malone DT, Hill MN, Rubino T. Adolescent cannabis use and psychosis: epidemiology and neurodevelopmental models. Br J Pharmacol. 2010 Jun;160(3):511-22. doi: 10.1111/j.1476-5381.2010.00721.x.PMID: 20590561

Monti MC, Zeugin J, Koch K, Milenkovic N, Scheurer E, Mercer-Chalmers-Bender K. Adulteration of low-delta-9-tetrahydrocannabinol products with synthetic cannabinoids: Results from drug checking services. Drug Test Anal. 2022 Jun;14(6):1026-1039. doi: 10.1002/dta.3220. Epub 2022 Feb 2.PMID: 34997693

Nachnani R, Hushagen K, Swaffield T, Jhaveri P, Vrana KE, Alexander CP. Cannabinoid Hyperemesis Syndrome and Hypophosphatemia in Adolescents. JPGN Rep. 2022 Sep 1;3(4):e248. doi: 10.1097/PG9.0000000000000248. eCollection 2022 Nov.PMID: 37168463

Reported Marijuana Exposure in Colorado, 2023 https://marijuanahealthreport.colorado.gov/health-data/poison-center-data (accessed 10-26-2023)

Jeff Hanley Bio

Jeff Hanley serves as the Executive Director of the Commonwealth Prevention Alliance, a statewide nonprofit that supports prevention professionals in reducing substance misuse and risk related behaviors. After graduating from the University of Mount Union (Ohio), Jeff began working in the nonprofit sector with the American Red Cross. After the Red Cross, he spent 14 years, at the Mercer County Behavioral Health Commission, as a prevention specialist and supervisor. Jeff and his wife Carrie (Director, Healthcare-Associated Infection Prevention Division at the PA Department of Health) reside in State College, PA.

Written Testimony
Hearing – Wednesday, November 1, 2023
Health Subcommittee on Healthcare

How Legalization of Adult Use Marijuana will Impact Children and Youth

Submitted by: Jeff Hanley
Executive Director, Commonwealth Prevention Alliance
jeff.hanley@paprevention.org

Date Submitted: 10.27.23

To: Health Committee Members

Thank you, Representative Frankel, Representative Rapp, and the members of the Health Committee and Subcommittee for this opportunity to testify. It's time for an honest conversation around marijuana legalization and how it can adversely impact youth and our communities.

For 47 years, the Commonwealth Prevention Alliance (CPA) has focused on advocating for essential substance use/misuse prevention priorities while supporting the professionals who do this important work across the state of Pennsylvania. For the past four years, I have served as the Executive Director of CPA. However, I'm certainly not new to the world of prevention as I spent approximately 20 years in field including at the Mercer County (PA) Single County Authority as a prevention specialist and supervisor. I also worked as the Special Projects Administrator of Opioid Programs, at the Jefferson County Public Health Department, Golden, Colorado.

Before legalizing recreational marijuana, can PA ensure the following safety measures? If not, let's hold off until we receive more data from legalized states.

Youth Protection

1. Youth use will not increase
2. Prohibit concentrates
3. Establish a low THC ceiling
4. Prohibit any product deemed appealing to youth and children (edibles, candies, gummies, etc.)
5. Legal for 21+, preferably 25+ years old
6. Establish advertising guidelines and address social media marketing to youth
7. Accidental overdoses will not increase
8. THC poison control calls will not increase with kids

Safe Communities

1. Provide a local opt in or local opt out
2. Ensure the public health and safety of our communities will not be impacted due to legalization
3. Ensure that positive THC tests in fatal car crashes are will not become more common than positive tests for alcohol

4. Ensure safe roads and highways
    - Provide an effective test for DUI and training of law enforcement
    - Sufficient funding, resources, and expertise for enforcement of cannabis laws.
    - Policies and practices to ensure that enforcement operations and priorities are not influenced by revenue or cannabis industry pressures
    - Clear enforcement guidelines and protocols to ensure fair and consistent enforcement
    - Publicly available and accessible records management system tracking enforcement actions
    - Inclusion in such a system of data by income, race, sex, and location to facilitate public monitoring of equity in enforcement practices
5. Protect pregnant women from use and predatory marketing
6. Include cannabis provisions in social host laws and clean air laws
7. Ensure this will not negatively impact the overdose epidemic and dissuade people who currently use drugs from evidence-based treatments like methadone and buprenorphine
8. Ensure the elimination of the black market

Effective Regulations

1. Require child proof packaging, plain packaging with no branding, warning labels, labels clearly and truthfully detailing the CBD/THC ratio
2. Prohibit sales of these products to outlets within 1,500 feet of schools
3. Create cannabis scientific board to approve or reject health claims and ads.
    - This board should be void of any cannabis lobbyists and cannabis companies

Prevention Efforts

1. Fully fund prevention efforts to state and local entities for:
    - Mass-reach interventions
    - Substance use prevention
    - Counter-marketing
    - Media campaigns
    - Address adult use to reduce youth risk factors

The Commonwealth Prevention Alliance opposes the legalization of recreational marijuana for the following reasons.

1. **Increase access to and use of marijuana among adolescents**, specifically to vulnerable populations like those with predisposed addictive disorder, youth, pregnant women, and marginalized communities.
2. Marijuana is **addictive** and can interfere with brain development and worsen mental health conditions.[1]
3. Recent studies add significantly to the evidence that marijuana use in adolescents has **adverse effects on mental health** with risk for depression, psychosis, and cognitive impairment, especially inhibitory control *(also known as response inhibition, permitting an individual to inhibit their impulses to select more appropriate behaviors consistent with one's goals).*[2]
4. **Safety should focus on high potency and road safety (over and over, state lab tests have disproven police claims of cannabis suspected of contamination[4])**. A new

analysis suggests that among adolescent marijuana users, smoking marijuana has become less prevalent, eclipsed by vaping and edibles. In addition, those who vaped THC (tetrahydrocannabinol, the main psychoactive compound in marijuana) or consumed edibles were more likely to use marijuana daily. [3]

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[1] *https://nida.nih.gov/publications/research-reports/marijuana/marijuana-addictive*
[2] *Morin JG, Afzali MH, Bourque J, et al. A population-based analysis of the relationship between substance use and adolescent cognitive development. Am J Psychiatry. 2019;176:98-*
[3] *https://jamanetwork.com/journals/jamapediatrics/fullarticle/2763823*
[4] *https://www.leafly.com/news/health/leafly-investigation-fentanyl-laced-marijuana-is-a-myth-its-time-to-end-the-hype*

Pennsylvania must thoroughly review the credible and available research regarding the impacts and consequences of youth and adult marijuana use/misuse on mental health, community safety, and substance use disorder.

We are still in the midst of the overdose epidemic. Vaping use is increasing substantially and marijuana or alcohol are the #1 substance of choice of PA youth. Adolescents today have grown up thinking marijuana is medicinal, "only" a plant, and not addictive. Mental health issues continue to increase at an alarming rate, impacting the overall behavioral health of youth and young adults. Prevention organizations, coalitions, and professionals are attempting to effectively prevent and address these issues with youth, young adults, and adults in their community. Legalizing and introducing recreational marijuana are counterintuitive to the health and safety of PA communities.

Youth Products and Use

How exactly are most youth using marijuana? As mentioned, analysis suggests that among adolescent marijuana users, smoking marijuana has become less prevalent, eclipsed by vaping and edibles. In addition, those who vaped THC or consumed edibles were more likely to use marijuana daily.[5] Marijuana potency has increased in the past decades, up from about 4% in the 1980s to an average of 15% today. Marijuana extracts, used in dabbing and edibles, can contain an average of 50% and up to 90% THC.

Edibles are food products infused with marijuana like gummi's, chocolate bars, beverages, etc. The effects from smoking marijuana only takes minutes, however, edibles take much longer because food is absorbed into the bloodstream through the liver. Because it takes longer, the user may end up consuming larger amounts of the edible while thinking it isn't working.

- In Colorado, emergency room visits tied to marijuana have risen dramatically since legalization. People using edibles suffered toxic reactions, including cardiac and psychiatric problems, at much higher rates than those smoking marijuana. [7]
- There were more than 11,100 calls to US poison control centers related to marijuana use in 2019, up from about 8,200 in 2017.[8]
- More and more of those calls are related to manufactured products (edibles) that contain distilled amounts of THC. [9]

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[4] *https://www.pccd.pa.gov/Juvenile-Justice/Pages/Pennsylvania-Youth-Survey-(PAYS)-2019.aspx*
[5] *https://jamanetwork.com/journals/jamapediatrics/fullarticle/2763823*
[7] *https://www.acpjournals.org/doi/10.7326/M18-2809*
[8/9] *Julia Dilley, PhD, epidemiologist, Oregon Public Health Division, Portland; Linda Richter, PhD, vice president, prevention research and analysis, Partnership to End Addiction; Paul Armentano, deputy director, NORML; JAMA Network Open, May 24, 2021*

Vaping and Dabbing are methods of ingesting cannabis oil extracts and popular with youth.

- The use of high-potency concentrates, like those found in vape pens also correlates with a higher incidence of mental and physical health problems and may lead to a higher risk of developing acute adverse effects, such as paranoia, psychosis, and cannabis hyperemesis syndrome. [10]
- According to the Pennsylvania Youth Survey, vaping marijuana has increased in 6th, 8th, 10th, and 12th graders since 2015.[11]
    - In 2015, 8.6% of students reported vaping marijuana
    - In 2017, 12.6% of students reported vaping marijuana
    - In 2019, 26.6% of students reported vaping marijuana

Legalization advocates continue to tell us it's "just" a plant. Edibles are manufactured and are NOT a plant. So, it's important to know that youth favor the high potency products and continue to vape, dab, and consume edibles.

Youth Mental Health

We are all aware of the mental health crisis impacting our youth. "Adolescence is a critical period, with increased risk for cannabis use, and; in particular, high THC potency cannabis use. This may represent a public health crisis", Dr. Christopher Hammond, MD, PhD. [12]

Early onset of cannabis use, according to Hammond, could lead to a number of health issues, including major depressive disorder, alcohol use disorders, substance use disorders, suicidality, anxiety disorders, bipolar disorders, psychosis, and delinquent behaviors.[13]

"There appears to be a relatively consistent pattern of findings showing that adolescent cannabis use is associated in a dose dependent manner with poor outcomes in academic and occupational functioning, cognition, and psychiatric and substance use outcomes, and that these may be worse for young people with mental health problems," said Hammond.[13]

Adolescent cannabis use could also lead to potential long-term brain effects, like dysfunction in white matter tracts, altered brain waves, and decreased brain blood flow. These effects are larger and more consistent with earlier age of onset and heavy use.[13]

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[10] *Prince MA, Conner BT. Examining links between cannabis potency and mental and physical health outcomes. Behav Res Ther 2019;115:111–20*
[11] *https://www.pccd.pa.gov/JuvenileJustice/Documents/2019%20PAYS/State%20of%20 Pennsylvania%20Profile%20Report.Final.pdf*
[12] *Christopher J. Hammond, MD, PhD, 2021 Annual Psychiatric TimesTM World CME Conference*

[13] *Morgan CJ, Gardener C, Schafer G, et al. Sub-chronic impact of cannabinoids in street cannabis on cognition, psychotic-like symptoms and psychological well-being. Psychol Med. 2012;42(2):391-400.*
[13] *Arterberry BJ, Padovano HT, Foster KT, et al. Higher average potency across the United States is associated with progression to first cannabis use disorder symptom. Drug Alcohol Depend. 2019;195:186-192.*
[13] *DiForti M, Quattrone D, Freeman TP, et al. The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicenter case-control study. Lancet Psychiatry. 2019;6(5):427-436.*
[13] *Hines LA, Freeman TP, Gage SH, et al. Association of high-potency cannabis use with mental health and substance use in adolescence. JAMA Psychiatry. 2020;77(10):1044-1051.*

Further, the percentage of reports of cannabis usage and incidents of cannabis use disorder (CUD) is much higher among adolescents.

- A long, school-based study found that cannabis use was associated with poorer functioning in high school students across more domains – academic performance, unpreparedness, delinquency, and mental health – compared to alcohol use. [14]

Mental Health Issues with PA Youth

Good mental health enables children to grow emotionally, mentally, socially, and physically. Depression, anxiety, and stress are known as negative emotions and are associated with quality of life. And, negative emotions are risk factors for adolescents. [15]

A number of scientific studies have identified a link between mental health problems, such as depression, and the use of alcohol, tobacco, & other drugs during adolescence. According to the 2019 PA youth survey, these four depressive symptoms were indicated by students in grades 6, 8, 10, & 12.[16]

- 38.0% of students reported, "sad or depressed most days in the past year"
- 25.0% of students reported, "sometimes life is just not worth it"
- 36.3% of students reported, "at times, I feel I am no good at all"
- 23.4% of students reported, "I am inclined to think I'm a failure"

There is a relationship between marijuana use and these students reporting depressive symptoms:[16]
Of the students reporting NO depressive symptoms:

- 4.7% report past 30-day marijuana use, and;
- 9.1% report lifetime marijuana use

Of the students reporting MODERATE depressive symptoms:

- 10.8% report past 30-day marijuana use, and;
- 19.5% report lifetime marijuana use

Of the students reporting HIGH depressive symptoms:

- 22.4% report past 30-day marijuana use, and;
- 36.0% report lifetime marijuana use

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[14] *D'Amico et al, NIH, 2016 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5016216/*
[15] *https://www.sciencedirect.com/science/article/pii/S1697260020300119*

[16] *https://www.pccd.pa.gov/JuvenileJustice/Documents/2019%20PAYS/State%20of%20Pennsylvania%20Profile%20Report.Final.pdf*

Following legalization, marijuana would inevitably become more readily available, accessible to the entire population and specifically to vulnerable populations like those with predisposed addictive disorders, youth, pregnant women, and low-socio economic communities.

It's important that we acknowledge Black people and Communities of Color who were and continue to be adversely affected by marijuana policies. States that have legalized have not been able to address this social justice issue which may indicate that it's systemic and not one that legalization can prevent. Per the American Civil Liberties Union, Black people are still more likely to be arrested for marijuana possession than White people in every state, including those that have legalized marijuana.[17]

In Illinois, past-month frequent THC use (> 20 days per month) tripled amongst African Americans, now up to 11%. This was consistent in Michigan, but not in neighboring non-commercialized states.[18]

Before considering legalization, it's our hope that an honest conversation around this issue will occur and that the voices of prevention, medical, and treatment communities would be represented and invited to the table.

Once again, thank you Representative Frankel, Representative Rapp, and the members of the Health Committee and Subcommittee for this opportunity to testify

Sincerely,
Jeff Hanley
Executive Director, Commonwealth Prevention Alliance

Jeff Hanley serves as the Executive Director of the Commonwealth Prevention Alliance, a statewide nonprofit that supports prevention professionals in reducing substance misuse and risk related behaviors. After graduating from the University of Mount Union (Ohio), Jeff began working in the nonprofit sector with the American Red Cross. After the Red Cross, he spent 14 years, at the Mercer County Behavioral Health Commission, as a prevention specialist and supervisor and 2 years in Colorado in Opioid Overdose Prevention. Jeff and his wife Carrie (Director, Healthcare-Associated Infection Prevention Division at the PA Department of Health) reside in State College, PA.

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[17] *https://www.aclu.org/report/tale-two-countries-racially-targeted-arrests-era-marijuana-reform*
[18] *https://cannabis.illinois.gov/media/reports-and-public-presentations.html*

Amanda Reiman, PhD MSW

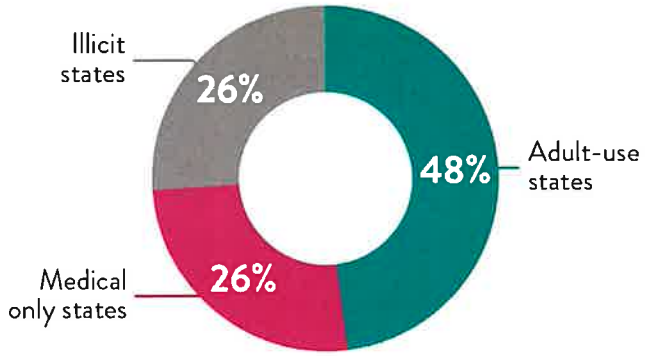
Amanda Reiman, PhD is the Chief Knowledge Officer for New Frontier Data. Dr. Reiman earned her PhD in Social Welfare from the University of California and conducted one of the first research studies on medical cannabis patients and the use of cannabis as a substitute for alcohol and other drugs. Having studied cannabis use and policy for over 20 years, she is an internationally recognized cannabis expert and public health researcher. Formerly the in-house cannabis expert for the Drug Policy Alliance, she has written for/been quoted in numerous national and international publications as well as peer reviewed academic journals and several textbooks.

74%

of the total U.S. population lives in a state with some form of legal cannabis framework.

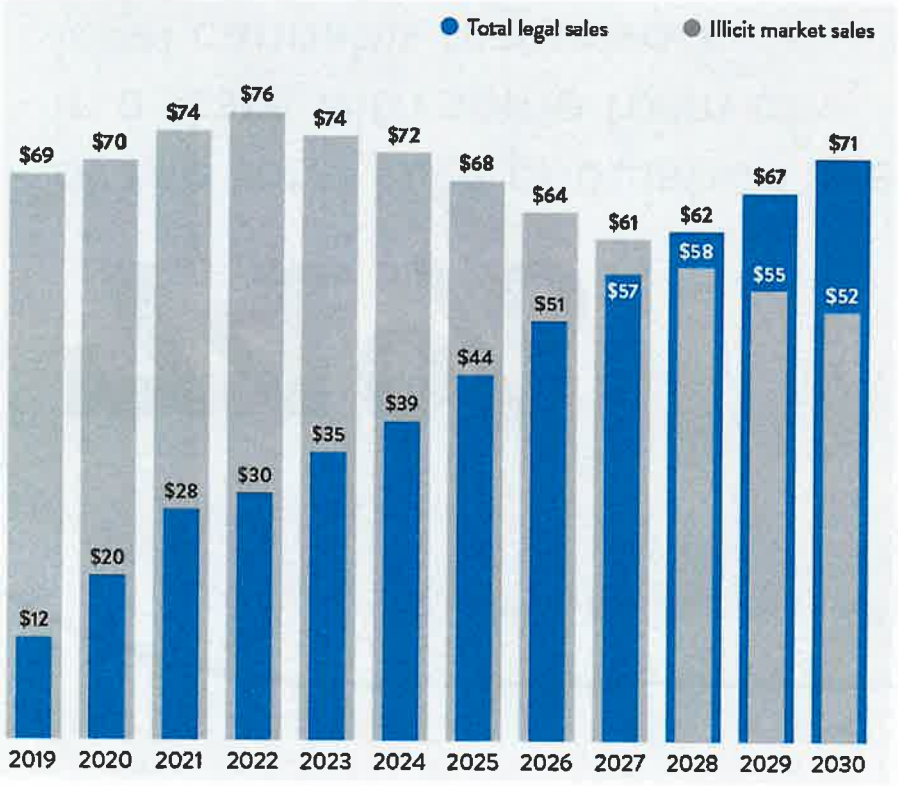
Home State Cannabis Laws

Percent of total U.S. population.

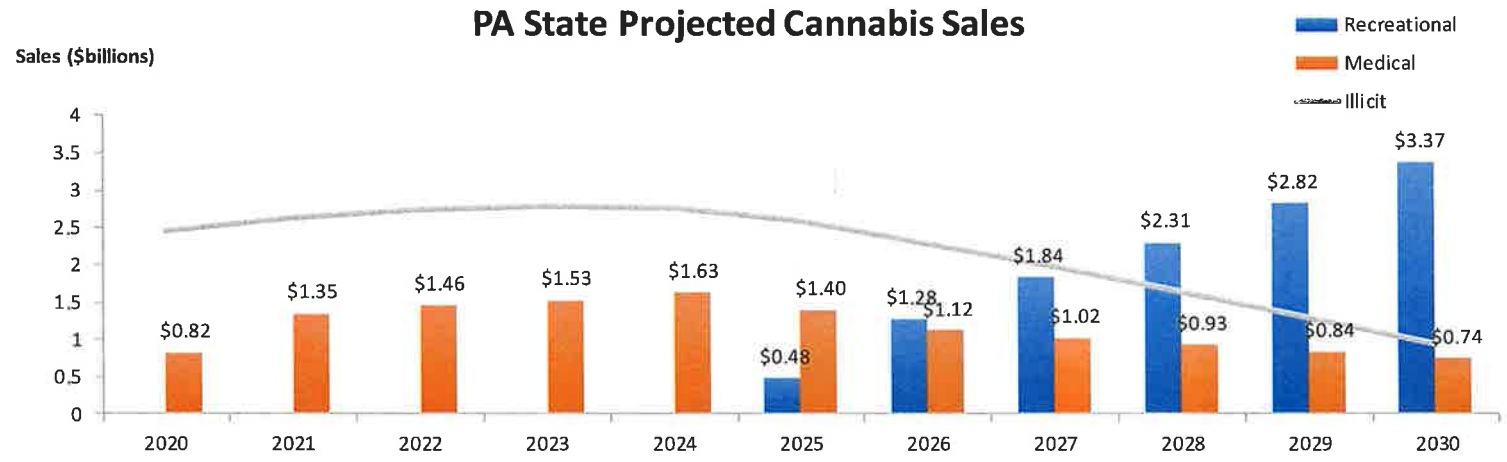


ADULT-USE STATE	**160.2 million**
MEDICAL STATE	**87.7 million**
ILLICIT STATE	**88.7 million**

Legal vs. Illicit Sales:
With Activation of Potential New State Markets by 2030
In $USD billions

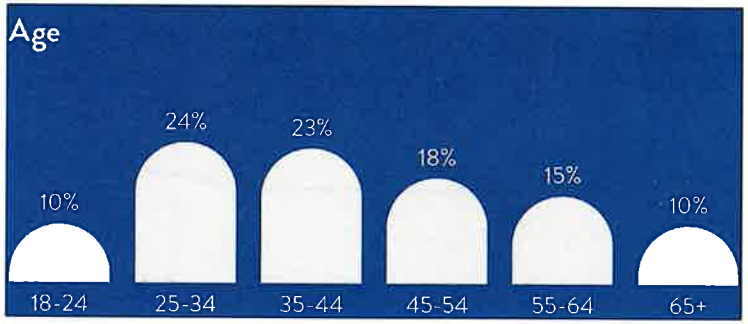


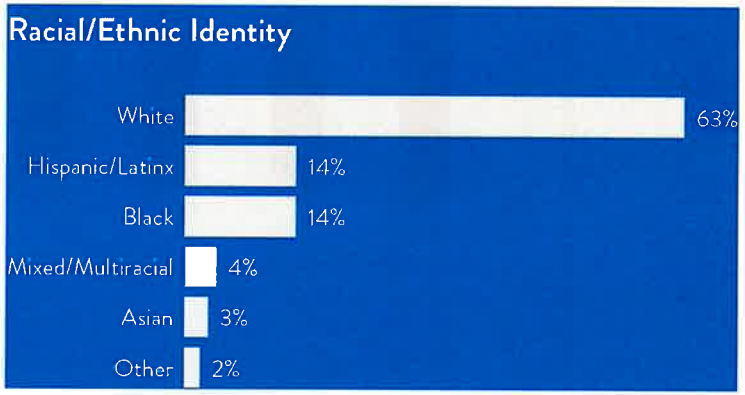
Legal vs. Illicit Sales:
Across Current Legal Markets Only
In $USD billions

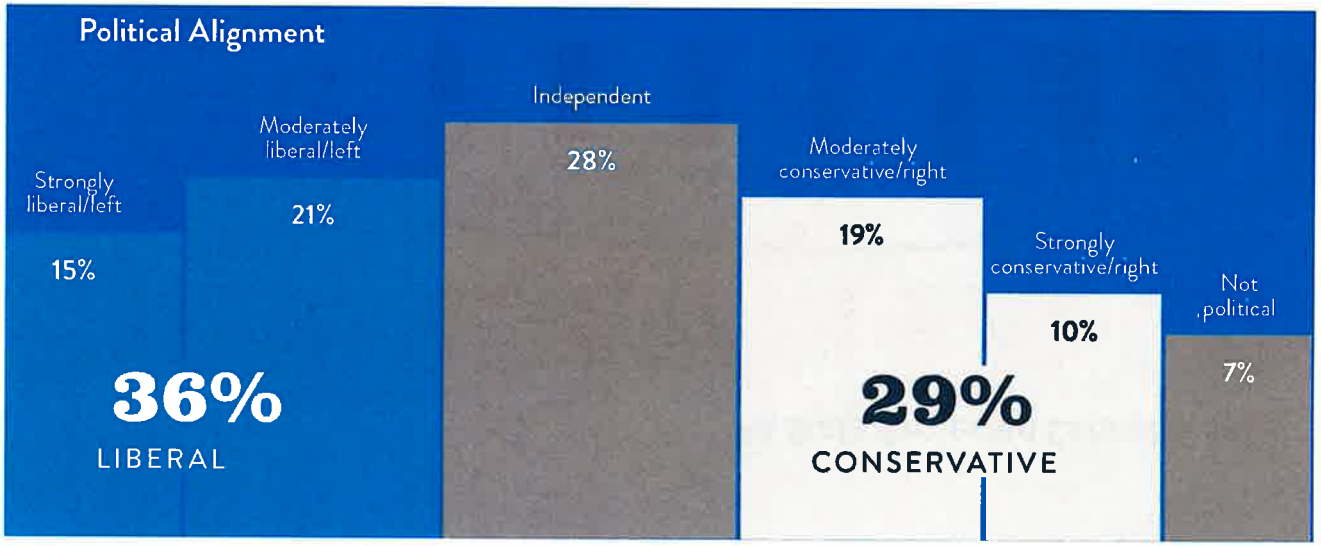

PA State Projected Cannabis Sales
Sales ($billions)
Recreational
Medical
Illicit
4
3.5
3
2.5
2
1.5
1
0.5
0
$0.82
$1.35
$1.46
$1.53
$1.63
$0.48
$1.40
$1.28
$1.12
$1.84
$1.02
$2.31
$0.93
$2.82
$0.84
$3.37
$0.74
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

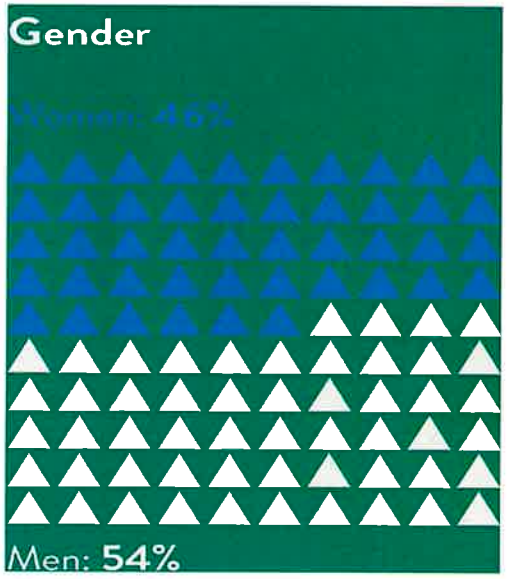

Sales ($billions)
Medical
Illicit
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
$-
$0.82
$1.35
$1.46
$1.53
$1.63
$1.73
$1.83
$1.93
$2.03
$2.13
$2.24
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

Current Consumers

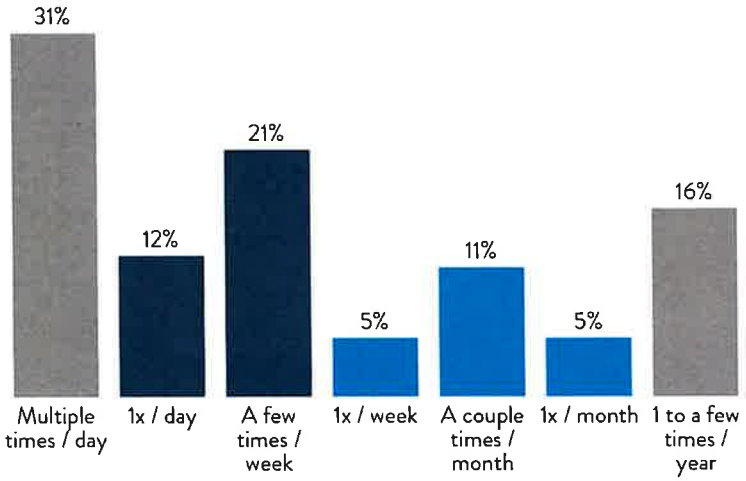








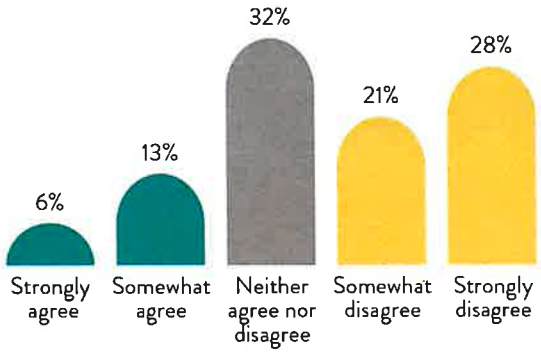
Use Frequency



33%
use once every day or two.

21%
use once a week to once a month.

I would like to cut back on my cannabis consumption.



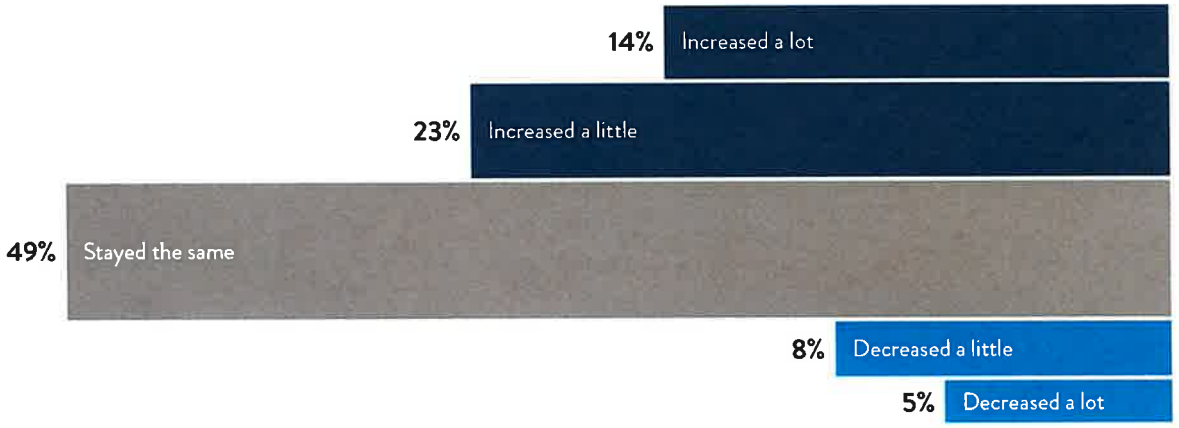
19%
AGREE

49%
DISAGREE

Change in Consumption Since 1 Year Ago

37%
INCREASED

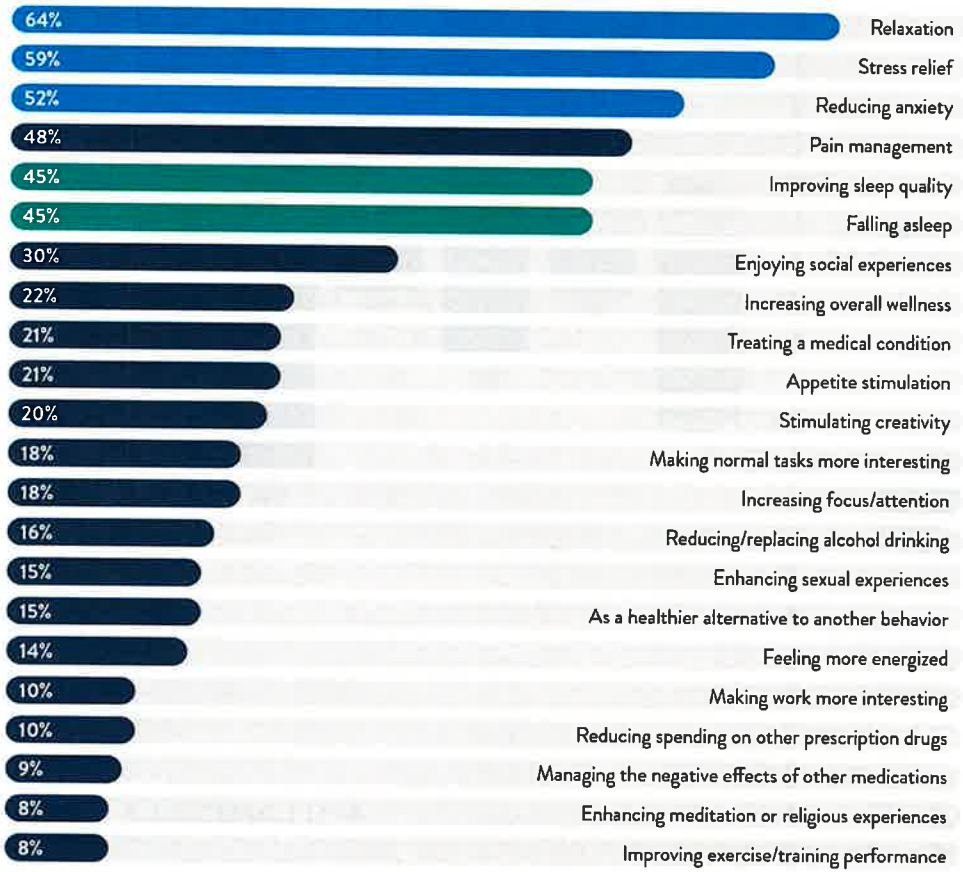
13%
DECREASED



Motivations for Use

83% use for unwinding (relaxation, stress or anxiety).

61% use for sleep (improving quality or falling asleep).



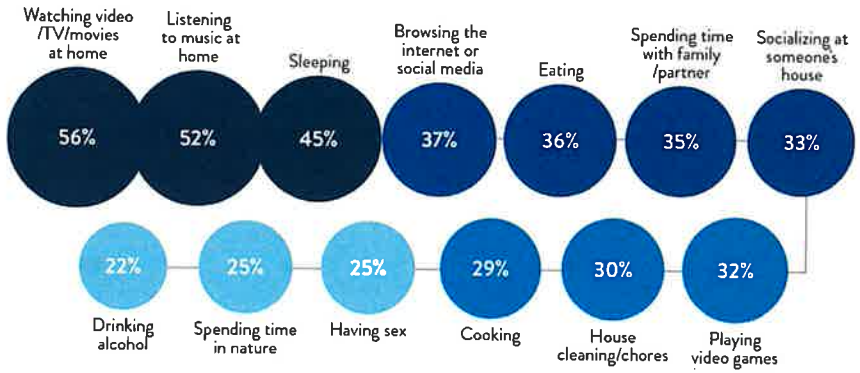
Primary Reason for Use

46% UNWINDING *relaxation / stress / anxiety*

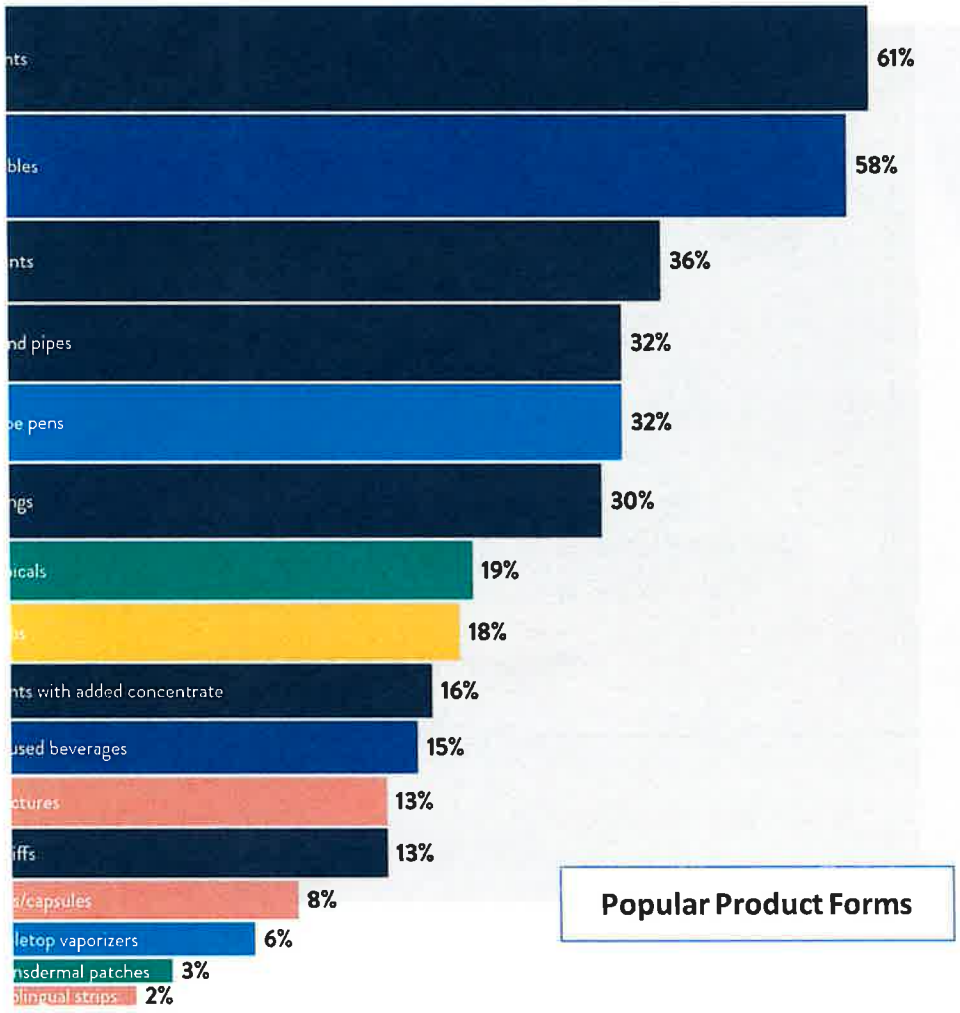
21% MEDICAL *treating pain / a medical condit*

11% SLEEP

Activities While/After Consuming

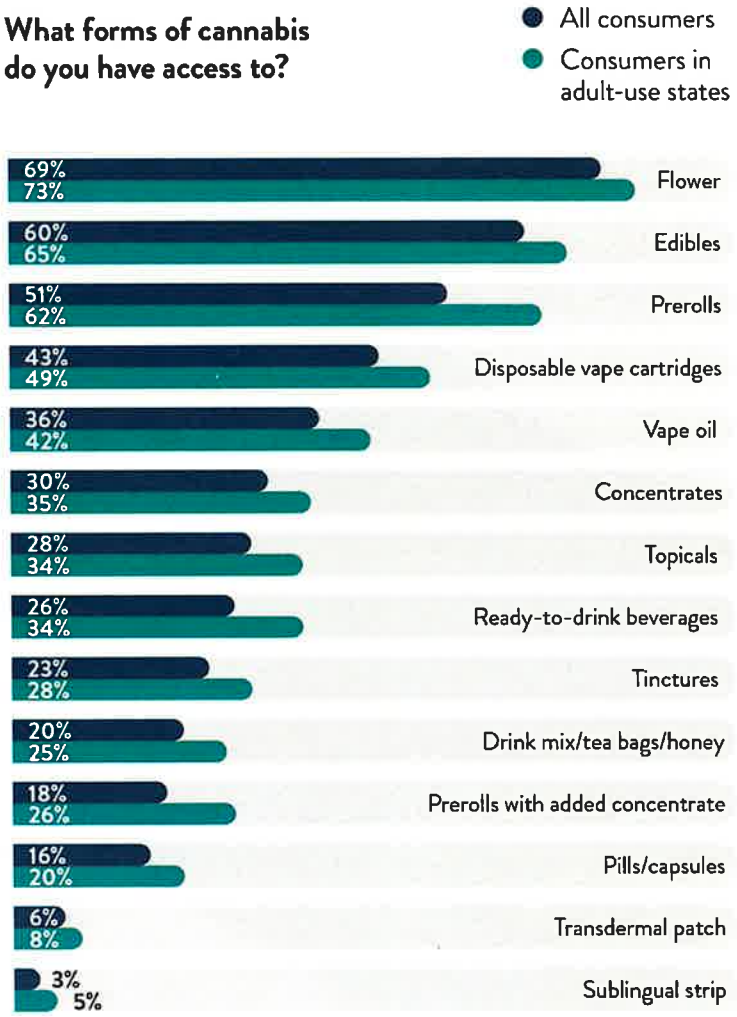


Product Forms



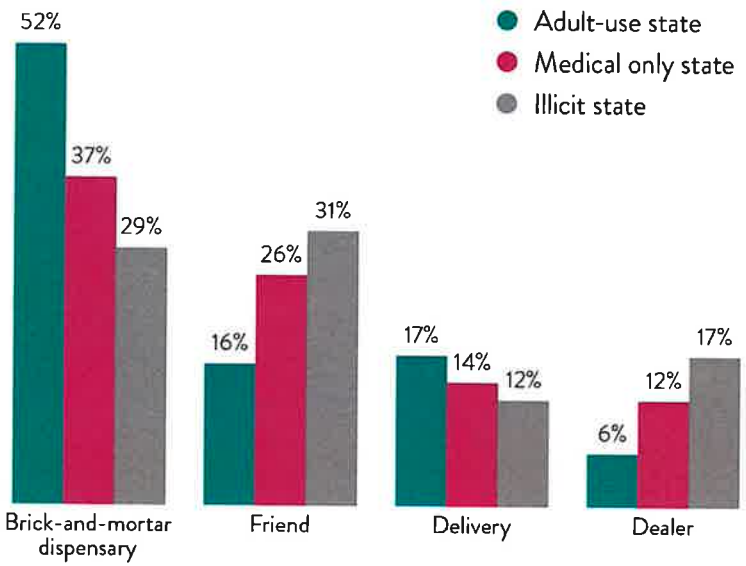
Popular Product Forms

What forms of cannabis do you have access to?

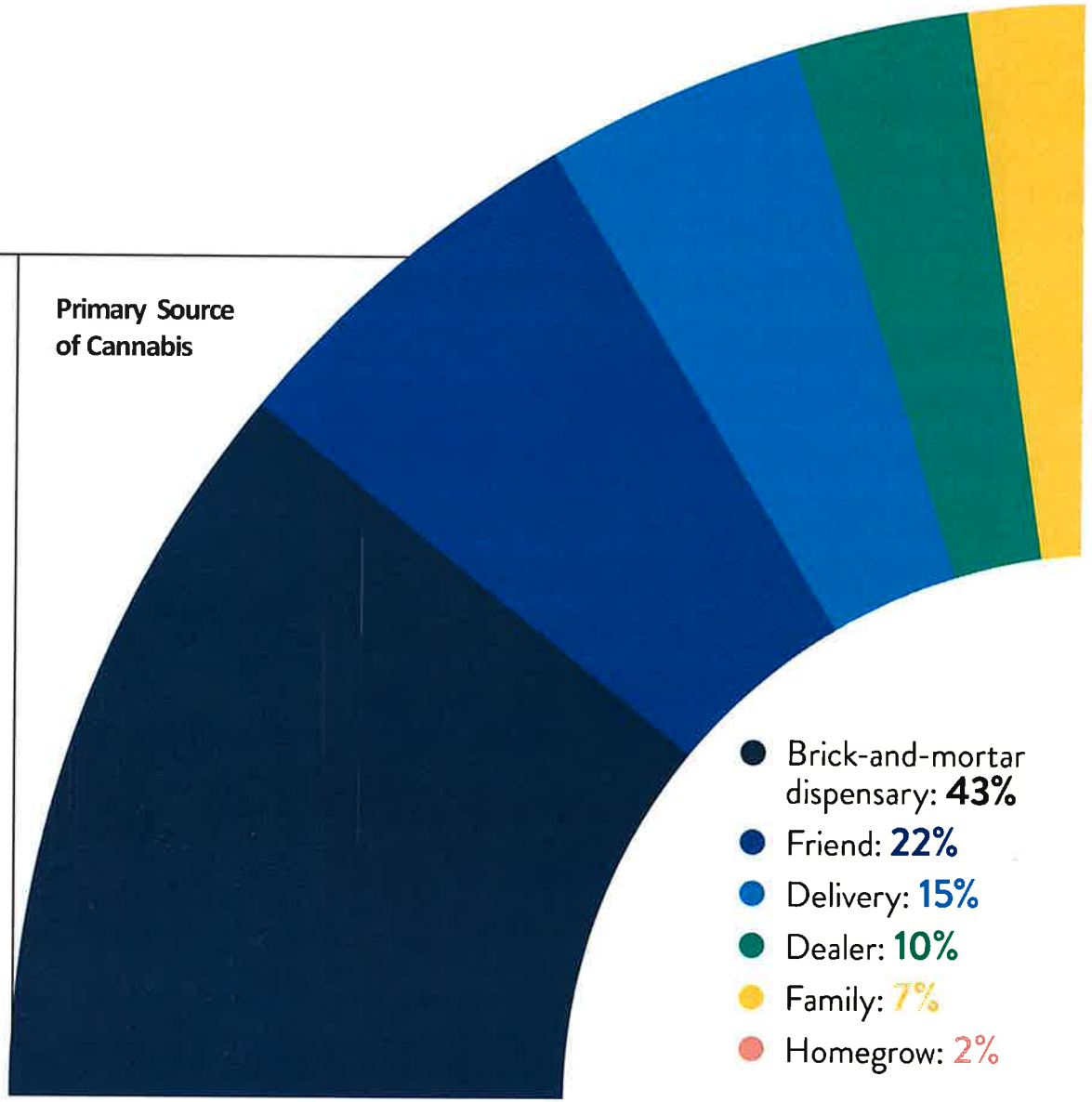


Sourcing & Spending

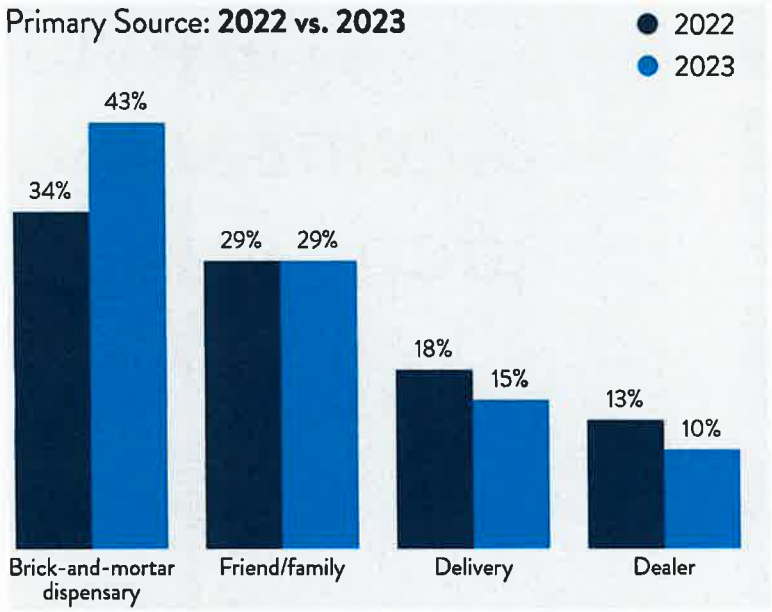
Primary Source: **By Home State Market**



Primary Source of Cannabis



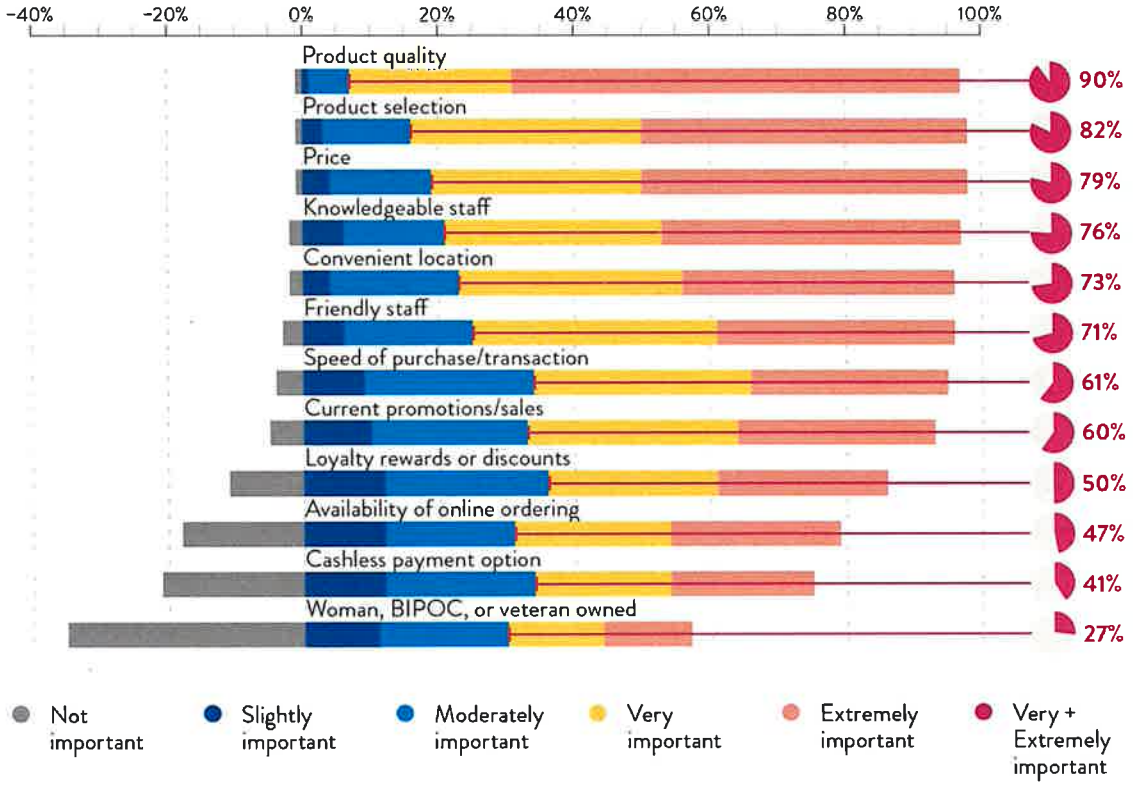
Sourcing & Spending



BUSINESS SOURCING DECISIONS

Among current (annual+) consumers who source cannabis from a business (brick & mortar or delivery service).

Source Decision Factors



Why don't people adopt the regulated market?

- Effective and efficient illicit market
- High taxes
- Product availability
- Lack of access due to local bans
- Continued prohibition style regulations (e.g. potency caps, bans on edibles)

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Dr. Caulkins specializes in systems analysis of the supply chains supporting illegal markets and criminal organizations, particularly problems pertaining to drugs, crime, terror, and prevention. Issues surrounding opioid markets and regulation, COVID-19 and cannabis legalization have been a focus in recent years, including co-authoring *Marijuana Legalization: What Everyone Needs to Know* (Oxford University Press).

The views Dr. Caulkins will offer are his own, and do not represent those of Carnegie Mellon or any other institution with which he is affiliated.

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PA House Health Committee Hearing
October 19th, 2023

Testimony submitted by:
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Steve University Professor of Operations Research and Public Policy
Carnegie Mellon University, Heinz College

Chairpersons Frankel and Rapp, distinguished Committee members, staff, and fellow panelists, thank you for the opportunity to submit written testimony today on this important topic of cannabis legalization and its potential impacts on illegal markets and social equity. My name is Jon Caulkins. I am a professor at Carnegie Mellon University, past co-director of RAND's Drug Policy Research Center, and co-author of an Oxford University Press book on marijuana legalization. I have been studying drug markets and drug policy for 35 years. My focus on cannabis legalization dates to 2010, when colleagues of mine at RAND and I did pioneering analysis of California's Proposition 19. That proposition was defeated, but it served as a model that influenced Colorado and Washington State's 2012 propositions that did pass, and thus indirectly most if not all state legalization measures since.

Legal and Illegal Market Shares

The first question I was asked to address is what share of a state's cannabis consumption one can expect to be served by legal supply (licensed or legal home grow) vs. the illegal market. The answer varies over time and across states, and it is impossible to know what is happening precisely because there are not good data on the scale of illegal activity, for obvious reasons. Nonetheless, based on my past work in Washington State (Caulkins et al., 2019), some current (not yet published) work with California, and parallel work by colleagues in other states, I think two-thirds legal and one-third illegal is a reasonable expectation for after the market has stabilized a few years after state-licensed supply opens and before national legalization.

That ballpark estimate comes with several elaborations and two warnings. The elaborations include: (1) It may take some time (perhaps 2-3 years) for the legal supply to ramp up, (2) Legal supply's market share may be greater for manufactured products (edibles, vape pen cartridges, etc.) than for basic flower, (3) Everything about state-legal cannabis markets including these market share estimates could be upended if and when the federal government legalizes, and (4) For these purposes I am treating as "legal" material that is sold legally and then diverted to youth. Such diversion is of course not legal, but the nature of the data do not permit distinguishing between instances when an adult purchases for their own use vs. purchasing for gift or resale to someone who is underage (e.g., a 21 year old purchasing on behalf of a 19 year old friend).

The first warning is that even if illegal supply's market share is reduced, say to one-third, that does not mean the size of the illegal market is reduced by anything close to that proportion, because the market

is growing. The liberalization of cannabis policy over the last 25 years has been accompanied by enormous growth in the quantity of cannabis consumed. We see that somewhat in prevalence statistics counting how many people self-report having used any cannabis in the past-month or past-year, but the bigger increase is in the intensity of use, not the number of users. This is apparent in conventional survey data (e.g., from the National Survey on Drug Use and Health or NSDUH) of self-reported days of cannabis use in the past month. Thirty years ago only about one-in-ten past-month cannabis users reported using daily or near-daily, the same proportion as for alcohol then and now. Now that proportion for cannabis is closer to 40 percent. That is, cannabis has transitioned from being primarily a "weekend recreational drug", akin to alcohol, to a drug whose consumption is utterly dominated by daily and near daily users, as with tobacco cigarettes. The other component of this increase in intensity of use has been a very large increase in the average number of milligrams of THC consumed per day of use. This happens for various reasons including higher potency flower products, an increasing share of extract-based products, and an increase in the number of occasions of use per day of use.

The upshot is that even if the nation has reduced illegal supply's market share by two-thirds, down to one-third, the scale of illegal supply has been reduced by far less, because illegal supply has a smaller share of a much larger market.

The second warning is that illegal supply's market share is to an important degree determined by policy and law enforcement. In states that aggressively arrest and prosecute illegal suppliers, legal supply can outcompete illegal suppliers. In states that ignore illegal suppliers, the illegal suppliers can outcompete legal suppliers. One of the big misunderstandings of cannabis legalization is that it means an end to cannabis-related law enforcement. However, it is exactly when legal supply provides a viable alternative that enforcement against illegal supply may be most productive.

Discussions about the relative competitiveness of legal and illegal supply often dwell on cannabis-specific excise taxes, but that misses the big picture. The main reason legal supply has extra costs is that there are extra costs associated with operating any type of legal business. One has to withhold payroll and income taxes from employees, comply with fair labor practices, and comply with conventional regulations. For me, a memorable example is a grower who was converting to legal supply complaining about the cost of retrofitting facilities to make them ADA compliant. What illegal suppliers should have to contend with is an "enforcement tax" that forces them to operate in covert and inefficient ways. Back when federal cannabis enforcement was aggressive, domestic cannabis production often occurred within residential homes ("grow houses") or in basements under artificial lights. Farmers don't grow tomatoes or cucumbers in residential homes or basements, and it isn't the most efficient place or way to grow cannabis plants either. Those methods are far less efficient than growing at scale in large green houses or farm fields. If law enforcement forces illegal suppliers to operate at small scale and go to great efforts to conceal production, and at times seizes property and other assets of illegal producers, the natural economies of scale that modern agricultural methods offer should be enough for legal supply to outcompete illegal supply. But if enforcement ignores illegal suppliers and lets them operate in similar ways as legal suppliers, but without withholding taxes or complying with the myriad regulations that apply to any legal business, then illegal producers remain competitive.

So, although the two-thirds/one-third split mentioned above may be a good rule of thumb, it is to a degree up to the state. If the state is determined to drive out illegal supply and is willing to commit the

resources, it can drive down illegal supply's market share. But the illegal supply won't just disappear on its own.

Social Equity Considerations with Legalization

There are three main prongs or categories of beneficiaries of social equity dimensions of cannabis legalization: (1) Addressing past cannabis-related convictions, (2) Ensuring diversity in the legal cannabis workforce, and (3) Ensuring equitable access to cannabis licenses. Most discussion focuses on the third. That is a mistake. It is by far the least important because it affects so few people compared to the first or even the second. These ideas are fleshed out in an article I co-authored based on data from Virginia (Kilmer et al., 2021), but I will summarize them here as I believe they would pertain to any state. They are not specific to Virginia, but I have data for Virginia so I refer to those numbers.

We estimated that in Virginia over a ten-year period, from 2010 to 2019, there were 90,000 convictions of adults for simple cannabis possession, with 50,000 of those 90,000 being Black, Indigenous, or People of Color (BIPOC). Those were convictions, not people convicted; someone could be convicted twice. On the other hand, cannabis prohibition was ongoing since well before 2010. Overall, we estimated that legislation in Virginia that expunged past convictions for simple cannabis possession would help 100,000 BIPOC plus 100,000 other individuals. Pennsylvania is a more populous state than Virginia, so perhaps in Pennsylvania the numbers could be more like 150,000 and 150,000. Presumably your staff can give you better estimates than I can, but I'd expect it to be in six figures.

Those numbers are vastly greater than the number of people who will be employed by the legal cannabis industry. Presently there is roughly one legal cannabis job for every $50,000 in annual sales. I trust that you have better estimates of projected sales revenue in Pennsylvania than I do, but just to illustrate the logic, suppose the legal market in Pennsylvania grew to $3 billion per year. Dividing by $50,000 suggests total employment of 60,000. If 20% of the workforce were social equity hires, that would be 12,000 people. In other words, very roughly ten times as many people would benefit from records expungement than would benefit from workforce diversity initiatives.

And there are many more cannabis industry workers than there are cannabis industry licensees. If that ratio is even 10 workers per owner, then you can see that the number of people who would benefit from records expungement could be 100 times as many as would receive licenses. And of course, not everyone who receives a license benefits from it. A common outcome for new start-up businesses is bankruptcy. That's not a comment about the cannabis industry; that's just a reality for all sorts of small business starts. So the number who benefit from expungement could be as much as 1,000 times more than the number who truly benefit from social equity licensing.

None of this is to say that there is anything wrong with any of the three prongs of social equity, but it is a caution that if so much time gets spent worrying about the licensing that not enough time is devoted to expungement, that would be a tragic missed opportunity. For example, if expungement is merely available to those who request it, not granted automatically, then many potential beneficiaries would not in fact receive that benefit. The particulars matter, and I hope that scarce legislative time and political capital prioritizes the records expungement side of legalization over debates about who gets how many licenses.

Note that there are other dimensions of cannabis legalization and social equity beyond the three I have mentioned. For example, there are concerns that if cannabis retail outlets cluster in disadvantaged neighborhoods, that could have detrimental health effects on already vulnerable populations, paralleling similar concerns regarding alcohol outlets. By focusing on the first three, I do not mean by omission to suggest that such other considerations are not also important.

Final Note

In theory, regulations can protect the public from malfeasance by regulated companies. In practice, compliance with regulations is imperfect, and it varies across industries. The industries with the best outcomes often have a culture of compliance. Outside of totalitarian states, regulators depend to an important degree on good faith cooperation from the regulated companies. With only a few exceptions, regulators do not have staff on sight at every licensed premise 24/7.

At the other end of the spectrum there are, or at least were in the past, industries that achieved "regulatory capture" in the sense of industry using legal or illegal means to get the government employees working within the regulatory agency to prioritize the health and profitability of the companies over the health and safety of the consumers or public more generally.

It is still early, much may change with federal legalization, and the following point will be roundly contested by others. But it is my judgement that on the whole, looking across various states, the state-licensed cannabis industry has been rather troubling in this regard. There have been multiple high-profile cases, such as three people – including the former chair of the Michigan Medical Cannabis Licensing Board and speaker of Michigan's House of Representatives[1] – going to prison for corrupt practices related to the licensed medical cannabis industry. There is hard evidence of product labels not being accurate, and many unpublished stories of how the cannabis testing industry has bad actors who cater to its customers, which is to say cater to the cannabis producers and sellers, not to the interests of the public (Vandrey et al., 2015; Oldfield et al., 2021 Schwabe et al., 2023).

Good governance is achieved only through deliberate prioritization and effort. It doesn't happen automatically. I hope that amidst all of the many other stakeholder demands related to cannabis legalization, there is still time to attend to the basics of making sure that those who are licensed to legally produce and sell cannabis – which is after all, a dependence-inducing intoxicant with known health risks – are held to high ethical standards.

References

[1] https://www.justice.gov/usao-wdmi/pr/2023_0928_Rick_Johnson_Sentencing#:~:text=GRAND%20RAPIDS%2C%20MICHIGAN%20%E2%80%93%20U.S.%20Attorney,Chairperson%20of%20the%20Michigan%20Medical

Caulkins, J. P., Davenport, S., Doanvo, A., Furlong, K., Siddique, A., Turner, M., & Kilmer, B. (2019). Triangulating web & general population surveys: do results match legal cannabis market sales?. *International Journal of Drug Policy*, *73*, 293-300.

Kilmer, B., Caulkins, J. P., Kilborn, M., Priest, M., & Warren, K. M. (2021). Cannabis legalization and social equity: some opportunities, puzzles, and trade-offs. *BUL Rev.*, *101*, 1003.

Oldfield, K., Ryan, J., Doppen, M., Kung, S., Braithwaite, I., & Newton-Howes, G. (2021). A systematic review of the label accuracy of cannabinoid-based products in regulated markets: is what's on the label what's in the product?. *Australasian Psychiatry*, *29*(1), 88-96.

Schwabe, A. L., Johnson, V., Harrelson, J., & McGlaughlin, M. E. (2023). Uncomfortably high: Testing reveals inflated THC potency on retail Cannabis labels. *PLoS one*, *18*(4), e0282396.

Vandrey, R., Raber, J. C., Raber, M. E., Douglass, B., Miller, C., & Bonn-Miller, M. O. (2015). Cannabinoid dose and label accuracy in edible medical cannabis products. *Jama*, *313*(24), 2491-2493.