CANNABIS FACTS

PUBLIC HEALTH EMERGENCY: The CA cannabis industry is facing a crisis of confidence due to corruption and significant regulatory failures at the CA Department of Cannabis Control (DCC).[1,2]

- The DCC was aware of products contaminated with pesticides, mold, heavy metals and fentanyl in ***legal*** cannabis supplies (exceeding federal levels) and of testing labs illegally manipulating test results per a DCC senior official turned whistle-blower.[1,2]
- These contaminants have severe health implications, particularly for vulnerable populations.[2]

STOREFRONT DISPENSARIES NORMALIZE YOUTH CANNABIS USE

- Regularly seeing cannabis advertising and dispensaries on school routes, within communities and near youth-oriented facilities leads to positive youth perceptions of cannabis, increase the risk and frequency of cannabis use and addiction in students as young as the 6th grade.[3]

CANNABIS IS DANGEROUS FOR OUR YOUTH

- THC levels have increased significantly, with formulations containing as much as 80-99% THC.[3]
- The CA Dept of Public Health warns that high-potency cannabis poses a threat to public health, particularly for young people whose brains are still developing, and is strongly associated with increased frequency of use, Cannabis Use Disorder, psychosis and schizophrenia.[4]

LICENSED CANNAIS DISPENSARIES DO NOT DECREASE YOUTH USE

- In LA county a higher density of both licensed and unlicensed cannabis dispensaries near youth homes is associated with a greater likelihood of use, heavier use and likely use.[5]
- Frequency of use amongst teen users rises by 26% with the onset of adult use retail sales.[4]

DECLINING CANNABIS REVENUES: California's cannabis tax revenues are down for the 4th consecutive years, despite an increase in the number of licensed retailers, and $1.3 billion is owed in back taxes representing nearly three years of tax revenues at current levels.[6]

No State Funding for Youth Education, Prevention, Early Intervention and Treatment: In February of 2024, over 60 drug prevention groups urged the governor to "to restore full funding for the Proposition 64 youth, environmental, and public safety programs" warning that the Tier 3 prevention programs would suffer a budgetary shortfall of more than $150 million collectively.

WILL OF REDONDO BEACH RESIDENTS: In 2022, Beach City residents voted "NO" to three storefront cannabis dispensaries and the repeal of their city's ban on non-medical marijuana businesses on identical ballot measure, despite all voting to legalize cannabis via Proposition 64.[7-11]

- El Segundo — 56% voted "NO" on Measure W ⟹ 61% voted YES on Proposition 64
- Manhattan Beach — 77% voted "NO" on Measure MB ⟹ 62% voted YES on Proposition 64
- Hermosa Beach — 71% voted "NO" on Measure M ⟹ 71% voted YES on Proposition 64
- Redondo Beach — 75% voted "NO" on Measure E ⟹ 65% voted YES on Proposition 64

COMMUNITY IMPACT: There are currently 36 cannabis dispensaries surrounding the Beach Cities ensuring resident access. Redondo Beach would be the *only* beach city to allow retail sales.

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Examining Associations Between Licensed and Unlicensed Outlet Density and Cannabis Outcomes From Preopening to Postopening of Recreational Cannabis Outlets

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Abstract

Background and Objectives: To expand on epidemiologic studies examining associations between the legalization of recreational cannabis and use among young adults, we examined the associations between licensed and unlicensed cannabis outlet density and cannabis outcomes.

Methods: A total of 1097 young adults aged 21 and older living in Los Angeles County were surveyed before licensed recreational cannabis outlets opened (Time 1: July to December 2017) and after (Time 2: July 2018 to June 2019). Using a database of open licensed and unlicensed cannabis retailers to calculate individual-level cannabis outlet density measures, we examined associations between outlet density within a 4-mile radius of participants' residences with Time 2 outcomes of any past-month use, daily use, intentions to use, quantity used, consequences, and cannabis use disorder (CUD) symptoms.

Results: After controlling for demographic factors and cannabis outcomes at a time point prior to their opening (Time 1), licensed cannabis outlets were associated with young adults' cannabis use, heavy use, and intentions, and unlicensed outlets were associated with young adults' heavy cannabis use and CUD symptoms.

Conclusion and Scientific Significance: This study expands beyond studies of outlet prevalence to find that, after controlling for outcomes 1 year prior, licensed and unlicensed outlets

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Declaration of Interest

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were associated with young adults' cannabis outcomes. The current study is among the first to find associations between cannabis use outcomes and density of cannabis outlets among young adults using data from two time points: preopening and postopening of recreational cannabis retailers. Findings can inform policies around the density and placement of cannabis outlets.

INTRODUCTION

Young adults are an at-risk group for heavy and problematic cannabis use. More than half of young adults initiate cannabis use by the age of 21,[1] and heavy use in young adulthood can lead to subsequent physical and cognitive health problems.[2] Trend studies have documented that prevalence rates for both cannabis use and cannabis use disorder (CUD) among young adults between the ages of 18 and 25 are rising in the United States, with those aged 21 to 25 reporting the heaviest use and most problems.[3–6] Young adults aged 21 to 25 are twice as likely to report CUD compared with other age groups,[4] and they are the least likely to pursue treatment for CUD.[7] Given emerging laws and regulations in the United States that have made cannabis more accessible to young people, it is important to examine young adults' use and problems in relation to changing policies, especially within the 11 states and the District of Columbia that have legalized possession and supply of recreational cannabis for those aged 21 and older.

Though researchers and policymakers have attempted to determine how legalization has affected cannabis outcomes among young people, thus far, studies have been largely based on examination of trends in cannabis use among adolescents from statewide or nationwide repeated cross-sectional surveys, and findings have been mixed.[8–10] Few studies have looked at young adults; as one example, a study of college students from 587 US institutions in 48 states found a general trend toward increased rates of past-month cannabis use in states that had recreational cannabis laws compared with those that did not.[11] With some exceptions, however, most studies do not factor in an essential component related to legalization: the emergence of cannabis outlets, which are retailers where individuals can legally purchase cannabis. Often, cannabis laws are passed months or years before regulations around the actual sale of cannabis are implemented, meaning that laws have been passed, but there are no retail outlets available for legal purchase. Thus, examinations of cannabis outcomes among young people post-legalization must factor in the availability of cannabis via these cannabis outlets.

Los Angeles (LA) County is an ideal location to study the effects of cannabis outlets on outcomes. LA County has a long-standing medical cannabis patient and dispensary program, starting in 1996 with more regulation by the state in 2003. The cultivation, possession, and sale of recreational cannabis for adults (age 21 and older) were passed by voter initiative in November 2016. On January 1, 2018, the state allowed recreational cannabis to be sold for nonmedical purposes at retail outlets after issuing licenses for cultivation, manufacturing, distribution, retail, and laboratory testing of the drug. Prior to this date, unregulated medical dispensaries flourished in California[12]; in 2016 and 2017, there were upwards of 900 medical cannabis dispensaries in LA County, yet there were no formal licensing procedures, and only 139 were in compliance with LA City's business tax regulations.[12,13] Legalization of recreational cannabis led to the conversion of many medical dispensaries to licensed

retailers and sparked the regulation and closing of unlicensed medical dispensaries. The Bureau of Cannabis Control became the sole authority of licensing retailers. Although LA County implemented practices to locate and shut down unlicensed cannabis outlets starting January 1, 2018, unlicensed cannabis outlets remained prevalent. Our recent work identified 430 cannabis outlets operating in the county as of March 2019, of which only 38% were licensed.[14]

Researchers have begun to examine how the density of cannabis outlets around schools and residential addresses are associated with cannabis use,[15–17] and how outlet locations are associated with the economic, neighborhood, and social environmental factors.[18–21] However, this work has focused almost exclusively on medical cannabis dispensaries in a time prior to the opening of retail outlets. Moreover, very few studies have examined the effects of cannabis outlets longitudinally, and those that do have examined trends based on repeated cross-sectional surveys and have looked at adolescents and not individuals who actually have access to cannabis through legal purchase at retail outlets (ie, those aged 21 and older).[22–24] Studies are needed to examine the unique contribution of cannabis outlets on young adult behavior during a *period after* cannabis was available through these outlets, while controlling for participants' cannabis use behavior prior to availability of cannabis through these recreational outlets. Such data would allow for stronger conclusions about whether individuals' cannabis outcomes are associated with the density of cannabis outlets.

The Present Study

This study used two time points to examine the associations between licensed and unlicensed cannabis outlets and cannabis outcomes among 1097 young adults from a period prior to the opening of recreational cannabis outlets to a period after recreational cannabis outlets were opened in LA County. Although medical dispensaries were available in the county for medical cannabis patients, there were no licensed recreational cannabis outlets prior to January 1, 2018, which represents the first time point in our data. We then assessed outcomes 1 year later during a period following the opening of recreational cannabis outlets (post-January 1, 2018), at which time many of the unregulated medical dispensaries were converted to retail outlets that sold both recreational and medical cannabis. Using a large-scale, multiwave online survey of young adults in LA County[25–27] and a comprehensive database of licensed and unlicensed cannabis outlets operating in LA County at one point in time during Time 2 (May 2019),[14] we examined whether the density of cannabis outlets by outlet licensure type (ie, licensed vs unlicensed) from individuals' residential addresses was associated with cannabis outcomes of any past-month cannabis use, daily/near-daily cannabis use, intentions to use cannabis in the next 6 months, quantity of cannabis flower/bud used per occasion, consequences from use, and CUD symptoms. After controlling for outcomes assessed prior to the opening of retail outlets, we hypothesized that greater cannabis outlet density would be positively associated with cannabis outcomes. We explored the differential effects of licensed and unlicensed outlets given the wide availability of unlicensed outlets in LA County.[14]

METHODS

Participants and Procedures

Participants were initially recruited in 2008 from 16 middle schools in Southern California when they were in 6th and 7th grades for an evaluation of voluntary after-school alcohol and other drug prevention program.[25] Since enrollment, they have completed 12 surveys assessing substance use. Details of the larger study, including participation and retention rates across waves, as well as details for how the sample was closely matched to larger nationally representative samples, are published elsewhere.[26–28] Briefly, youth completed surveys about substance use behavior and attitudes initially during physical education classes and then moved to online surveys once they began high school. Retention rates for each survey ranged from 61% to 91% across all waves. We fielded the full sample at every wave so that all participants had an opportunity to participate in each survey.

For the current study, we began with 2277 participants who had completed the survey at Time 1 (wave 10 of the larger study) and restricted that sample to 1097 participants who (a) lived in LA County at Time 1 and Time 2 (excluding $n = 358$ from the original 2277), (b) were 21 years or older at Time 2 (excluding $n = 75$) to include only participants who had legal access to enter recreational outlets, and (c) completed the Time 1 survey before (July 1, 2017 to December 31, 2017) and Time 2 survey after (July 1, 2018 to June 1, 2019) the opening of recreational cannabis outlets (excluding $n = 747$). Participants completed the Time 1 and Time 2 surveys 1 year apart. The sample represented 44% of the larger cohort at Time 2 (1097/2497 of wave 11 participants), with no significant differences from the larger sample on demographics or any of the six included outcomes.

Density of Cannabis Outlets at Time 2

We used a multistep process to identify and geocode cannabis retailers in LA County. Methods are discussed briefly and described in detail elsewhere.[14] First, we searched online cannabis outlets directories (ie, WeedMaps, Leafly) to create a database of both licensed and unlicensed cannabis outlets in LA County. We then verified address data and confirmed that each outlet was open for business through direct in-person observations of the outlet's storefront. We confirmed whether each outlet was licensed or unlicensed to sell cannabis through a review of official online tools from the City of LA Department of Cannabis Regulation and the California Bureau of Cannabis Control. Procedures were completed in March 2019 and represented the 430 cannabis outlets open for business during the approximate time participants completed the Time 2 survey. Of these outlets, 162 were verified as licensed to sell cannabis and 268 were unlicensed (but operating). It was unclear for how long these outlets had been open at the time of data collection.

Addresses from the 1097 participants were used to calculate the average distance traveled (as the crow flies) over all times of the day and days of the week for a 10-minute (4 miles; range: 0–9 miles) time frame, based on the average driving distance in the United States for consumer goods being about 3.8 miles.[29,30] As in our prior work,[17] this 4-mile radius was calculated by drawing circular buffers around respondents' home addresses and counting the number of licensed outlets within the mileage buffer. We created a similar measure of the

density of unlicensed outlets. In a prior cross-sectional study of medical cannabis dispensaries, we examined the effects of outlets' signage[17] as an individual passing by an outlet may not know that cannabis is available inside in the absence of clear signage. Although we collected data on signage outside of the 430 cannabis outlets,[14] there was extensive overlap between indicators of clear signage and licensed status, such that licensed outlets were more likely to have clear signage. Thus, presenting findings for indicators of clear signage would be redundant.

Measures

Outcomes—Three outcomes were assessed at both time points for all participants. *Any past-month cannabis use* was assessed using items from the Monitoring the Future study (1 = 0 days to 7 = 20–30 days), which was dichotomized to any past-month use vs no past-month use. *Daily/near-daily cannabis use* was determined by dichotomizing participants from the past-month use item who reported use on 20 to 30 days in the past month vs those who did not. Participants were asked if they had *intentions to use cannabis in the next 6 months* (1 = definitely no to 4 = definitely yes).[31] An additional three outcomes were assessed among participants who reported any past-year use of cannabis using an item from the Monitoring the Future study (1 = none to 7 = 20 or more times) (n = 530). These participants were asked about *the quantity of cannabis flower/bud used per occasion* using an image depicting response options from 1 = "Less than 0.25 g" to 10 = "More than 5 g." These responses were recoded to represent quantities in grams (eg, "between 1 and 1.5 g" recoded to 1.25 g) with a final range from 0.25 to 5 g. Those who did not use flower/bud were coded as 0. We focused on flower/bud given the popularity of this form of cannabis consumption over other forms. Participants also indicated how often in the past year (1 = never to 7 = 20 or more times) they experienced 10 *cannabis use consequences* (eg, less motivation to do things, relationships negatively impacted).[32,33] The items were summed to create a composite score (α = .91). The Cannabis Use Disorders Short Form (CUDIT-SF)[34] was used to assess for *CUD symptoms* over the past 6 months (not able to stop using marijuana/cannabis once they had started; devoted a great deal of their time to getting, using, or recovering from marijuana/cannabis; had a problem with their memory or concentration after using marijuana/cannabis); these items were rated 0 = never to 4 = daily or almost daily with a summary indicating a CUD severity score (α = .72).

Covariates

Participants reported on age, gender, race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, non-Hispanic Asian, non-Hispanic other/multiracial), and college student status at Time 2 (not in college, in college part time, in college full time). Participants also reported their mother's educational attainment, which served as a proxy for socioeconomic status.[35] We controlled for neighborhood socioeconomic status using five census tract-level indicator variables from the American Community Survey[36]: median household income, level of education for the population 25 years and older, percent of population aged 16 and older that is unemployed, percent of households with children 18 years and younger that are female-headed, and percent of households below the federal poverty level. As in prior work,[17] the index was calculated using the coefficients estimated from confirmatory factor analysis and merged using each participant's census tract code. Neighborhood

socioeconomic conditions have been correlated with both licensed and unlicensed retailers in California. Specifically, research has shown that the density of cannabis retailers is correlated with neighborhoods that have more people of color and greater poverty.[37] We also included possession of a medical cannabis card at Time 1, which indicated whether the participant was enrolled in California's medical marijuana program and served as an indicator of legal access to cannabis via dispensaries at Time 1. Time 1 outcomes were included to control for use and intentions in the prior year when retail outlets had not yet been open.

Analytic Plan

We conducted six models for each specified outcome at Time 2: any use, daily/near-daily use, and intentions to use for the entire sample, and quantity of cannabis flower used per occasion, cannabis consequences, and CUDIT-SF scores for those reporting past-year cannabis use. For continuous outcomes, we used traditional linear regression; for dichotomous outcomes, we used logistic regression. All models were estimated in R. Each model included covariates of corresponding Time 1 cannabis outcome and possession of a medical cannabis card at Time 1; Time 2 age, gender, race/ethnicity, college status, mother's education, and neighborhood socioeconomic status. In each of the six models, we included both licensed and unlicensed cannabis outlets to examine their unique effects.

RESULTS

Sample Description

Table 1 includes demographics and descriptive statistics of cannabis outcomes, while Table 2 contains the estimates and confidence intervals for the six outcome models, including covariates. In each model, the Time 1 outcome was significantly positively associated with the Time 2 outcome.

Cannabis Outlets Within 4 Miles

Any Past-Month Cannabis Use—A higher number of licensed cannabis outlets within 4 miles of home was significantly associated with a greater likelihood of past-month cannabis use after controlling for any use the prior year (odds ratio [OR] = 1.007 [confidence interval [CI]: 1.002, 1.013]). For each additional licensed cannabis outlet, there was an expected 0.7% increase in the odds of using cannabis in the past month. For example, there was an approximate 10% increase in the odds of using cannabis for someone with 14 licensed outlets within a 4-mile radius compared with someone with no outlets. The count of unlicensed cannabis outlets within 4 miles was not significantly associated with past-month use.

Any Daily/Near-Daily Past-Month Cannabis Use—Daily/near-daily use was significantly associated with the count of licensed cannabis outlets within 4 miles (OR = 1.004 [CI: 1.001, 1.007]), with a 0.4% increase in the odds of daily/near-daily use for each additional licensed outlet, and with the count of unlicensed cannabis outlets within 4 miles (OR = 1.003 [CI: 1.001, 1.005]) with a 0.3% increase in the odds of daily/near-daily use for each additional unlicensed outlet.

Intentions to Use Cannabis in the Next 6 Months—The count of licensed cannabis outlets within 4 miles was significantly associated with intentions to use ($B = 0.012$; SE = 0.006; $t = 1.97$, $P = .049$). The count of unlicensed cannabis outlets within 4 miles was not significantly associated with intentions.

Quantity of Cannabis Flower/Bud Used Per Occasion—Among those with past-year use, the number of unlicensed cannabis outlets within 4 miles was significantly associated with greater quantity consumed ($B = 0.010$; SE = 0.004; $t = 2.384$, $P = .018$). The number of licensed cannabis outlets was not significantly associated with the quantity of use.

Cannabis Use Consequences—Neither cannabis outlet density measure was significantly associated with cannabis use consequences among those who used cannabis in the past year.

CUD Symptoms (CUDIT-SF Scores)—Among those with past-year cannabis use, a higher count of unlicensed cannabis outlets within 4 miles was significantly associated with higher scores on the CUDIT-SF ($B = 0.046$; SE = 0.022; $t = 2.13$, $P = .035$). The count of licensed cannabis outlets was not significantly associated with the CUDIT-SF.

DISCUSSION

The current study used data across two time points to examine the associations between the density of cannabis outlets around young adults' homes and their cannabis use, intentions to use, and consequences. Data were taken from two distinct time points, preopening and postopening of recreational cannabis retailers in LA County, and include an examination of both licensed and unlicensed cannabis outlets; the latter of which has been absent from most prior work. Findings mirrored prior cross-sectional studies showing associations between medical cannabis dispensaries and young adult cannabis outcomes,[16,17,37,38] and generally indicated that the density of cannabis outlets around a 4-mile area of one's residential address was associated with multiple cannabis outcomes. These associations between cannabis outlets and outcomes were observed during the first year of licensed cannabis retailers despite an already crowded market of unlicensed medical cannabis dispensaries in LA County in the year prior to the opening of licensed outlets.[12,17,21] Yet, our findings were robust even after controlling for possession of a medical cannabis card during the year prior, which served as an indicator of access to cannabis from outlets at that time. Results were also robust even after controlling for sociodemographic characteristics at individual and neighborhood levels, as well as after controlling for individuals' cannabis outcomes the year prior.

Findings varied by specific cannabis outcome and by cannabis retailer licensure status. For licensed outlets, higher density was significantly associated with an increased likelihood of past-month use, increased likelihood of past-month daily/near-daily use, and stronger intentions to use cannabis in the next 6 months. For unlicensed outlets, which made up 62% of all outlets at Time 2,[14] higher density of outlets was significantly associated with an increased likelihood of past-month daily/near-daily use, and for those with past-year use, greater quantity consumed, and more symptoms of CUD. Of note, the density of outlets was

not significantly associated with consequences, perhaps because the measure focused more on social and relational effects of cannabis use than the symptoms of CUD assessed by the CUDIT-SF.

The mechanisms through which licensed and unlicensed outlets affect outcomes are not entirely clear and an area for future research, but for those young adults reporting past-year use, we found the density of unlicensed retailers was significantly associated with heavier use (ie, greater quantity used per occasion) and CUD symptoms, whereas licensed outlets were not. Unlicensed retailers are illegal and do not abide by licensing requirements that prohibit the sale of cannabis products from unlicensed producers or that restrict minors from entering the store and purchasing products, paying sales tax, and limiting the amount of cannabis that can be purchased by an adult each day. Young adults who use cannabis more frequently may be drawn to purchasing from unlicensed shops because of discounted prices and lack of regulation on purchase quantities. Unlicensed products, which do not abide by packaging and testing regulations, may also contain harmful contaminants and misrepresent product potency. In other work, young adults who reported the use of high-potency cannabis products also reported higher CUDIT scores and risk of dependence compared with those who used less potent cannabis products.[39] Thus, the efforts to regulate unlicensed retailers and reduce the density of cannabis retailers may be important factors to be considered when implementing strategies to mitigate potential public health harms from expanded legal access to cannabis.

Limitations

By design, we looked at the effects of cannabis outlets on those who were legally able to purchase cannabis from outlets at Time 2; thus, our sample is restricted to those who were 21 years old at Time 2, which limits the generalizability to other young adults. Although it is a strength of the study that we have Time 1 outcomes prior to the opening of licensed cannabis outlets for participants, we may be modeling the novelty effects of a new legal market. In future work, we can monitor changes in cannabis behavior in subsequent waves. Moreover, Time 1 and Time 2 assessments were 1 year apart, and although most participants completed their Time 2 survey between November 2018 and April 2019, our cannabis outlets database represented the open outlets during March 2019, which is the time period we collected the outlet data. We were unable to look at the exact number of open outlets for each participant at the time they completed their Time 2 survey.

Also, we do not have direct data on whether young adults in our sample purchased cannabis from retail outlets (eg, they could have been given cannabis from a friend) or what retailer they purchased cannabis from. Although we attempted to control for this by including Time 1 outcomes in models, it is also possible that recreational outlets emerged in areas that already had higher cannabis use; presumably, retailers targeted areas where more customers would live. Future studies should test if associations hold among young adults who report purchasing cannabis from retailers and examine how opening retail cannabis outlets has changed modes of cannabis use and product preferences—particularly given some of the newer high-potency products that are of public health concern.[9] In addition, we examined one county in a state with laws for legalized recreational cannabis and with a large number

of licensed and unlicensed cannabis outlets. Future studies will need to determine if effects are similar in other states with varying laws, as well as in different municipalities throughout California, where laws for cannabis outlets may differ. Finally, although the effects reported here are compelling, especially considering the number of covariates included, effect sizes are small. Continued longitudinal research is needed to better understand the short- and long-term effects of recreational cannabis legalization.

CONCLUSIONS

Findings indicate that among young adults aged 21 and older in LA County, a higher density of both licensed and unlicensed cannabis outlets near young adults' homes was associated with greater likelihood of use, heavier use, stronger intentions to use, and more problematic use during a period after the opening of recreational cannabis outlets. Regulations for licensed outlets, as well as greater enforcement of penalties for unlicensed cannabis outlets, may be needed. Beyond increased legal access to cannabis, there are possibly indirect effects associated with changes in cannabis outcomes among young adults, such as increased perceptions of the acceptability of cannabis use and effects from outlets' advertising (eg, on freeway billboards). Complementary studies should use longitudinal approaches to examine how cannabis outlet density also affects underage use.

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TABLE 1.

Sample descriptives, information on cannabis outlets, and cannabis outcomes

		N = 1097
Covariates		
● Age at Time 2, mean (SD)		21.6 (0.6)
● Female gender, % (*n*)		56.2 (617)
● Mother's educational level, % (*n*)		
○ Did not finish high school		14.0 (154)
○ Completed high school		15.8 (173)
○ Completed some college		14.1 (155)
○ Completed college or higher		48.7 (534)
○Do not know		7.4 (81)
● College student status at Time 2, % (*n*)		
○ Not currently in college		35.1 (385)
○ In college part time		13.8 (151)
○ In college full time		51.1 (561)
● Race/ethnicity, % (*n*)		
○ Hispanic		48.3 (530)
○ Non-Hispanic white		17.5 (192)
○ Non-Hispanic black		3.1 (34)
○ Non-Hispanic Asian		19.6 (215)
○ Non-Hispanic other/multiracial		11.5 (126)
● Medical cannabis card at Time 1, % (*n*)		10.4 (105)
Exposures: Cannabis outlets		
● Number of licensed cannabis outlets within 4 miles of individual's home address, mean (SD)		5.9 (4.8)
● Number of unlicensed cannabis outlets within 4 miles of individual's home address, mean (SD)		7.6 (6.5)
Cannabis outcomes	**Time 1**	**Time 2**
Any past-month use of cannabis, % (*n*)	30.0 (329)	29.5 (324)
Any past-month daily or near-daily use of cannabis, % (*n*)	8.0 (88)	9.1 (100)
Intentions to use cannabis in the next 6 months (range, 1–4), mean (SD)	2.1 (1.2)	2.1 (1.2)
Quantity of cannabis flower/bud used per occassion[a] (range, 0–5), mean (SD)	0.6 (0.8)	0.7 (0.8)

	N = 1097	
Cannabis use consequences [a] (range, 10–70), mean (SD)	14.4 (7.6)	15.1 (8.5)
CUD symptoms (CUDIT-SF score) [a] (range, 0–12), mean (SD)	1.5 (2.2)	1.8 (2.6)

CUD = cannabis use disorder; CUDIT-SF = Cannabis Use Disorders Short Form.

[a] Outcomes assessed and reported for participants reporting past-year use of cannabis. Mean age at Time 1 was 20.63, SD = 0.60.

TABLE 2.

Density of cannabis outlets within 4 miles and cannabis outcomes

	Standardized coefficients (95% confidence interval)					
	Any past-month cannabis use	Any past-month daily/near-daily cannabis use	Intention to use cannabis in next 6 months	Quantity of cannabis flower/bud used per occassion[a]	Cannabis use consequences[a]	CUD symptoms (CUDIT-SF)[a]
Cannabis outlets						
● Number of licensed cannabis outlets within 4 miles	**0.007** (0.002, 0.013)	**0.004** (0.001, 0.007)	**0.012** (0.001, 0.024)	0.010 (−0.003, 0.022)	0.095 (−0.039, 0.229)	0.043 (−0.026, 0.112)
● Number of unlicensed cannabis outlets within 4 miles	0.000 (−0.005, 0.003)	**0.003** (0.000, 0.005)	0.007 (−0.001, 0.016)	**0.010** (0.002, 0.019)	0.036 (−0.054, 0.127)	**0.046** (0.004, 0.089)
Covariates						
● Cannabis outcome at Time 1	**0.465** (0.409, 0.522)	**0.503** (0.443, 0.563)	**0.677** (0.621, 0.724)	**0.523** (0.448, 0.599)	**0.490** (0.413, 0.567)	**0.506** (0.356, 0.656)
● Neighborhood SES	0.027 (−0.006, 0.059)	**0.035** (0.015, 0.055)	0.056 (−0.012, 0.124)	−0.021 (−0.101, 0.059)	−0.673 (−1.487, 0.141)	0.251 (−0.160, 0.661)
● Age	0.002 (−0.039, 0.044)	0.013 (−0.012, 0.038)	−0.003 (−0.089, 0.084)	**−0.113** (−0.223, −0.003)	**−1.868** (−2.970, −0.767)	−0.375 (−0.941, 0.190)
● Hispanic race/ethnicity[b]	−0.031 (−0.104, 0.043)	0.028 (−0.017, 0.073)	−0.133 (−0.287, 0.021)	0.109 (−0.059, 0.277)	0.181 (−1.505, 1.867)	**0.950** (0.029, 1.872)
● Asian race/ethnicity[b]	−0.059 (−0.138, 0.020)	0.009 (−0.039, 0.057)	−0.105 (−0.271, 0.061)	0.045 (−0.164, 0.254)	1.420 (−0.593, 3.434)	0.505 (−0.579, 1.589)
● Black/African-American race/ethnicity[b]	0.043 (−0.103, 0.190)	**0.135** (0.046, 0.224)	0.015 (−0.291, 0.321)	0.093 (−0.242, 0.438)	**3.505** (0.203, 6.807)	**1.805** (0.290, 3.320)
● Other race/ethnicity[b]	0.052 (−0.038, 0.142)	0.003 (−0.052, 0.058)	0.131 (−0.059, 0.320)	0.101 (−0.122, 0.325)	1.603 (−0.567, 3.772)	−0.137 (−1.301, 1.028)
● Gender	**−0.057** (−0.102, −0.011)	0.003 (−0.025, 0.030)	−0.042 (−0.137, 0.053)	−0.069 (−0.184, 0.047)	−0.966 (−2.125, 0.194)	−0.492 (−1.143, 0.160)
● Mother graduated high school[c]	−0.073 (−0.154, 0.008)	−0.024 (−0.073, 0.026)	0.083 (−0.086, 0.252)	0.112 (−0.101, 0.324)	0.361 (−1.743, 2.465)	0.525 (−0.647, 1.698)
● Mother completed some college[c]	−0.060 (−0.146, 0.026)	−0.033 (−0.086, 0.019)	0.084 (−0.096, 0.264)	**0.232** (0.022, 0.443)	1.451 (−0.712, 3.613)	0.632 (−0.549, 1.814)
● Mother graduated college[c]	−0.016 (−0.087, 0.055)	−0.031 (−0.074, 0.012)	0.066 (−0.082, 0.215)	0.100 (−0.079, 0.279)	1.056 (−0.811, 2.923)	0.487 (−0.484, 1.459)
● Part-time college student[d]	−0.053 (−0.131, 0.024)	−0.002 (−0.049, 0.045)	0.148 (−0.013, 0.310)	−0.047 (−0.151, 0.245)	0.344 (−1.635, 2.324)	−0.245 (−1.289, 0.797)
● Full-time college student[d]	**−0.055** (−0.109, −0.000)	−0.010 (−0.044, 0.023)	0.085 (−0.030, 0.200)	−0.102 (−0.238, 0.034)	−1.278 (−2.628, 0.071)	−0.354 (−1.058, 0.350)

Am J Addict. Author manuscript; available in PMC 2021 May 27.

	Standardized coefficients (95% confidence interval)					
	Any past-month cannabis use	Any past-month daily/near-daily cannabis use	Intention to use cannabis in next 6 months	Quantity of cannabis flower/bud used per occassion[a]	Cannabis use consequences[a]	CUD symptoms (CUDIT-SF)[a]
● Medical marijuana card at Time 1	**0.210** (0.124, 0.296)	**0.209** (0.154, 0.264)	**0.362** (0.184, 0.539)	0.109 (−0.045, 0.263)	1.505 (−0.022, 3.032)	0.302 (−0.403, 1.007)

These standardized coefficient estimates reflect change in log odds for the unit change in the indicated predictor. For example, the standardized coefficient of 0.003 for any past-month daily/near-daily cannabis use is the change in log odds for every additional outlet. Bolded values indicate statistically significant estimates with a *P*-value < .05.

CUD = cannabis use disorder; CUDIT-SF = Cannabis Use Disorders Short Form.

[a]Outcome reported for participants who reported use of cannabis in the past year.

[b]Non-Hispanic white as reference group.

[c]Mother did not graduate high school as reference group.

[d]Nonstudent status as reference group.

February 22, 2024

The Honorable Gavin Newsom, Governor
The Honorable Mike McGuire, Senate President Pro Tem
The Honorable Robert Rivas, Speaker of the Assembly
State Capitol Building
Sacramento, CA 95814

RE: State Budget: Proposition 64 Tier 3 Program Revenues

Dear Governor Newsom, Senate Pro Tem McGuire, and Assembly Speaker Rivas:

The undersigned organizations respectfully urge you to restore full funding for the Proposition 64 (Adult Use of Marijuana Act Initiative) youth, environmental, and public safety programs ("Tier 3 programs").

When voters approved Proposition 64, they dedicated significant Cannabis Excise Tax and Cultivation Tax revenues for the Tier 3 programs. These revenues are a significant funding source for childcare for low-income families, youth substance use prevention programs, environmental remediation including restoration of watersheds damaged by cannabis cultivation, and law enforcement programs. Many of our groups worked on the Proposition 64 Tier 3 language and want to ensure the provisions of law and promises made to date are upheld.

Unless corrective action is taken, these programs will suffer from a budgetary shortfall of more than $150 million collectively over the 2023-24 and 2024-25 budget years as a result of the Legislature's elimination of the Proposition 64 cultivation tax.

Promises Made in the 2021-22 Budget (AB 195 Budget Trailer Bill):

AB 195 eliminated the Proposition 64 Cultivation Tax, among other actions, at the request of the cannabis industry. Our organizations withdrew our opposition when the Legislature and Governor agreed the ultimate outcome of the cultivation tax repeal would be revenue neutral including establishing a $670 million annual funding target for Tier 3 programs. We greatly appreciate the Legislature and Governor appropriating $150 million from the General Fund in the 2021-22 budget to help backfill the lost Tier 3 cultivation tax revenues.

Unfortunately, even with the General Fund allocation, Tier 3 revenues will have fallen short of the $670 million annual target by more than $50 million in just the 2023-24 budget. This has had real world impacts to Tier 3 programs. For example, Tier 3 funding for children's programs was $30 million below the funding target in the 2023-24 budget alone.

The Governor's optimistic 2024-2025 budget proposal projects $568.8 million for Tier 3 programs — more than $100 million below AB 195's $670 million annual Tier 3 revenue target. That would mean that Tier 3 programs will have received $151 million less than the AB 195 target over just two budget years. The shortfall will be even more if the actual Cannabis Excise Tax revenues fall short of the Governor's optimistic projections. These shortfalls will mean thousands of fewer child care slots for low-income children, fewer youth benefitting from substance abuse prevention programs, continuing environmental degradation of our watersheds, and other harms.

Proposition 64 – Voters Guaranteed Tier 3 Revenues

When voters approved Proposition 64 in 2016, they expressed clear intent they wanted Tier 3 programs to receive significant funding:

"It is the intent of the People in enacting this Act to accomplish the following: "Generate hundreds of millions of dollars in new state revenue annually for restoring and repairing the environment, youth treatment and prevention, community investment, and law enforcement." Prop. 64, § 3(t).

"The Adult Use of Marijuana Act will crack down on the illegal use of water and punish bad actors, while providing funds to restore lands that have been damaged by illegal marijuana grows." Prop. 64, § 2.F.

Furthermore, voters expressly protected allocations to the Tier 3 programs in Proposition 64's provisions:

"Prior to July 1, 2028, the Legislature may not change the allocations to programs specified in subdivisions (d) and (f) of this section." [Subdivision (h) of Section 34019 of the Revenue and Taxation Code, as enacted under Proposition 64, referring to the Tier 3 funding allocations].

Furthermore, Proposition 64 requires that other amendments must be *"consistent with the purposes and intent of this Act..." (Section 10 of Proposition 64)*

Those statements reflect voters' clear intent that Proposition 64 provides robust and protected funding for the environmental restoration and remediation programs and youth services at levels contemplated by the voters and those levels must be honored in any legislative alteration to the Act's tax structure. Therefore, revenue neutrality is a necessary component to any amendment of the initiative. Any reduction of tax revenue for Tier 3 programs creates a risk that the legislation will be deemed invalid.

In other words, unless it results in revenue neutrality, the elimination of the Cannabis Cultivation Tax is legally vulnerable because:

1. It alters the allocation of funding to Tier 3 programs by eliminating one of the two key revenue streams that fund the Tier 3 allocations; and

2. It would be inconsistent with the voter's intent expressly stated in Proposition 64's text to provide significant funding to Tier 3 programs.

Solutions to Preventing the Loss of Tier 3 Funding as a Result of the Cultivation Tax Repeal:

We greatly appreciate the Legislature's intent to establish a program that resulted in revenue neutrality when it eliminated the Proposition 64 Cannabis Cultivation Tax. Unfortunately, the net result will be more than $150 million in projected Tier 3 revenue losses over the two budget cycles, with significant continuing losses in subsequent years.

Fortunately, you have options on how to fix this problem and achieve the Tier 3 revenue neutrality goal. These options include, among others, the following:

- Reinstate the Cannabis Cultivation tax on large cannabis cultivators (outdoor cultivation over one acre and indoor cultivation over 20,000 square feet);
- Appropriate additional General Fund or other revenues, when available; and
- Increase the Cannabis Excise Tax beginning in 2025, consistent with AB 195 (Revenue and Taxation Code Section 34011.2)

We greatly appreciate your commitment to Tier 3 revenue neutrality. We look forward to working with you to correct this shortfall. We will follow-up this letter with a request to meet with your offices.

Thank you for considering these concerns.

Sincerely,

Jim Keddy
Executive Director
Youth Forward

Youth Forward

Matt Baker
Policy Director
Planning and Conservation League

Planning and Conservation League

Mary Ignatius
Executive Director
Parent Voices California

PARENT VOICES

Dr. Lynn Silver
Principal Investigator
Getting It Right from the Start

PUBLIC HEALTH INSTITUTE

Courtney Armstrong
Director of Government Affairs
First 5 Association of California

FIRST 5

Benita Ramsey
Executive Director
Rainbow Pride Youth Alliance

RAINBOW PRIDE YOUTH ALLIANCE

Pam Flick
California Program Director
Defenders of Wildlife

DEFENDERS OF WILDLIFE

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CEO
Youth Alliance

YOUTH ALLIANCE

Douglas Styles
Executive Director
Huckleberry Youth Programs, Inc.

HUCKLEBERRY YOUTH PROGRAMS

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Juma Ventures

JUMA
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Mending Fences At JM Ranch

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Youth Transforming Justice

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Promotores Collaborative Of San Luis Obispo County

Promotores Collaborative of San Luis Obispo County

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Oracles of Truth Academy

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Youth Business Alliance

Heather Williams
Director, Policy & Outreach
California AfterSchool Network

California AfterSchool Network

Kristan Culbert
Associate Director
California River Conservation
American Rivers

AMERICAN RIVERS

cc: The Honorable Scott Wiener, Chair, Senate Budget and Fiscal Review Committee
The Honorable Jesse Gabriel, Chair, Assembly Budget Committee
The Honorable Caroline Menjivar, Chair, Senate Budget and Fiscal Review Subcommittee #3
The Honorable Josh Becker, Chair, Senate Budget and Fiscal Subcommittee #2
The Honorable Corey Jackson, Chair, Assembly Budget Subcommittee # 2
The Honorable Steve Bennett, Assembly Budget Subcommittee #4
The Honorable Steve Glazer, Chair, Senate Governance and Finance Committee
The Honorable Jacqui Irwin, Chair, Assembly Revenue and Taxation Committee

BREAKING

After chaotic auction, new owner announces plans for private SF Bay island

CANNABIS

Whistleblower: Calif. knew about toxic pot products, looked the other way

By **Lester Black**, *Cannabis editor*
Sep 12, 2024

FILE: Cannabis plants growing at a California cannabis farm.
Kandarp Gupta/Getty Images

A former senior official with California's Department of Cannabis Control is accusing the agency of retaliating against her after she repeatedly warned her superiors about corruption and toxic products being sold in the legal cannabis market, according to a lawsuit filed this week in Los Angeles.

SFGATE

Tanisha Bogans, the whistleblower, was hired in 2022 to run the DCC's Laboratory Services division, which is responsible for regulating cannabis labs and cannabis testing in the state's legal market. According the lawsuit filed Monday, Bogans said the agency was aware of reports of numerous problems in the legal market, including products contaminated with pesticides and fentanyl, labs illegally manipulating test results and some license holders engaging in illegal sales and "corruption."

David Hafner, a spokesperson for the department, declined to comment on the lawsuit's details, saying in an email Thursday morning that the DCC "does not comment on personnel matters or pending litigation."

The lawsuit comes as the DCC faces increased scrutiny regarding pesticide contamination in the legal market, which experts say could be harming public health.

According to her suit, Bogans said the agency received numerous credible reports of contaminated products being sold on the legal market, starting as early as October 2023. The suit said she brought these and concerns about test results and "potency inflation" to her manager and DCC Director Nicole Elliott, yet the agency allegedly never acted. Bogans said she faced "hostility and accusations" from Elliott after she tried to coordinate a response from other DCC departments on the potency issue, which "tarnished her reputation."

DCC Director Nicole Elliott pictured during an interview on YouTube.
Screenshot via YouTube.

In November 2023, the suit said, Bogans contacted the Department of Justice after receiving a tip that there was fentanyl, a potent synthetic painkiller, in cannabis products. According to the suit, her manager then "severely reprimanded" her. SFGATE has not been able to find any confirmed reports of fentanyl contamination in cannabis products.

Bogans' suit said she was then excluded from meetings she would have otherwise been in. It said she believes the "intentional exclusion was due to the DCC's resistance to the public's efforts to address the regulatory

issues rampant throughout the California cannabis market."

By December, the suit said, the lab division was raising concerns about banned pesticides being found in legal cannabis products. According to the suit, she personally tried to get the agency to seek criminal charges against responsible parties, although she did not specify who those parties are.

On Jan. 11, 2024, the suit said, she requested the DCC refer to pesticide contamination problems to other state and federal agencies. But then a day later, according to the suit, Elliott told she was fired, despite having received a performance evaluation that she was "exceeding expectations" two months earlier.

Bogans is seeking damages to be determined at a trial related to whistleblower retaliation, and the intentional infliction of emotional distress.

More Cannabis Coverage

— 'Just smoke': Why one Bay Area doctor says you should never use pot vapes
— This San Francisco church has 115K members yet might be illegal
— 'Broken system': Banned pesticides keep showing up in California's legal pot
— Newsom's controversial hemp THC ban approved, effective immediately
— California's pot economy is crashing. What comes next?

— **Full SFGATE cannabis coverage**

Sep 12, 2024

Lester Black
CANNABIS EDITOR

Lester Black is SFGATE's cannabis editor. He was born in Torrance, raised in Seattle, and has written for FiveThirtyEight.com, High Country News, The Guardian, The Albuquerque Journal, The Tennessean, and many other publications. He was previously the cannabis columnist for The Stranger.

Around The Web


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Harbor Hills
Rolling Hills
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Miraleste

CANNABIS AND YOUTH HEALTH AND SAFETY

Adopted by Convention Delegates May 5, 2024

WHEREAS The tetrahydrocannabinol (THC) concentrations in current commercially available cannabis has increased substantially over the last 40 years, along with a large increase in the diversity of cannabis products and formulations, exposing our youth to high-potency cannabis preparations leading to increased frequency of use, increased dependency and the progression to higher potency products; and

WHEREAS There are acute effects associated with youth use of cannabis, including the risk of cardiovascular events, hyperemesis syndrome, acute intoxication, and auto accidents when youth drive under the influence of cannabis; and

WHEREAS There are long-term effects associated with youth cannabis use, including the risk of e-cigarette or vaping associated lung injury (EVALI), Cannabis Use Disorder (CUD), psychosis, schizophrenia, decreased cognitive function, negative impacts on attention, memory, learning and educational/vocational attainment, increased risks of dependency and addiction, adverse effects on mental health and chronic exposure to secondhand cannabis smoke; and

WHEREAS The legalization of cannabis and has led to increased cannabis use in vulnerable populations during critical developmental windows, including during pregnancy, where in-utero exposure impacts long-term developmental outcomes and in early childhood development and adolescence, two of the most critical time periods for brain growth and development; and,

WHEREAS Although cannabis can be used medicinally, the wide variety of high-potency THC products and formulations, the lack of standardized dosing and limited dosing information on packaging and the lack of short and long-term safety information has led to increasing numbers of children unintentionally exposed to cannabis, resulting in increased calls to poison control centers, unscheduled emergency department and urgent care visits and hospitalizations; and

WHEREAS Hemp-derived products containing psychoactive cannabinoids (compounds found in cannabis) and synthetic cannabinoids are marketed outside of the legal cannabis system, with limited or no dosage or potency information, have contamination concerns, no age restrictions, and are easily accessible to youth; and

WHEREAS Cannabis manufacturers utilize product design, packaging, promotion, advertising, social media, smoking lounges, cafes and restaurants, product flavoring and a variety of delivery devices and preparations designed to appeal to youth and vulnerable populations; and

WHEREAS Licensed storefront cannabis dispensaries are not allowed within 600 feet of schools, day care or youth centers unless allowed by local government; however, youth who regularly see cannabis advertising and dispensaries on school routes, within their communities and near youth-oriented facilities have positive early perceptions of cannabis and cannabis availability and are more likely to become early, cannabis users and this is exacerbated by high-density dispensary areas; and **now therefore be it.**

RESOLVED That California State PTA and its units, councils and districts support education campaigns for families and educators on the evolution of THC potency, the diversity of cannabis products and formulations and the risks associated with youth exposure to high-potency cannabis that include increased risks for cannabis dependency and progression to higher potency cannabis products; and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to educate families and educators on the acute impacts of cannabis use on youth health; and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to provide families and educators education on the risk of youth driving while under the influence of cannabis and on existing laws regarding cannabis and operating motorized vehicles in order to prevent crashes, collisions and to save lives; and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to launch campaigns to educate families and educators on the dangers and negative effects of long-term cannabis use on youth; and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to launch campaigns to educate families and educators on the dangers of involuntary second-hand cannabis smoke exposure; and be it further

RESOLVED That California State PTA and its units, councils and districts support education to families and educators about the health risks of using cannabis during pregnancy to both the mother and baby, and the potential long-term negative health consequences to children who were exposed to cannabis in-utero; and be it further

RESOLVED That California State PTA and its units, councils and districts support education campaigns to families and educators about the risks of cannabis exposure in early childhood and adolescent brain development; and be it further

RESOLVED That the California State PTA supports the rights of parents and legal guardians to access cannabis for use when medically prescribed or recommended by medical providers and the California State PTA and its units, councils and districts encourage our PTA leaders to offer programs to educate families and educators regarding their responsibility to properly secure and dispose of cannabis products; and be it further,

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other local measures to support the following for cannabis, synthetic cannabis and hemp-derived products containing psychoactive cannabinoids: the importance of

secure storage, the early restriction of new products that do not have adequate safety data, child resistant packaging that does not appeal to children, with warnings about the importance of safe storage and labels that clearly and consistently state the dose of THC/psychoactive cannabinoids per serving; and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to restrict the sale and marketing of hemp-derived products containing psychoactive cannabinoids outside of the legal cannabis market, and to launch education programs for families and educators on the potential dangers of hemp-derived products containing psychoactive cannabinoids that include potential overdose, hospitalization, lung damage and e-cigarette or vaping associated lung injury (EVALI); and be it further

RESOLVED That California State PTA and its units, councils and districts seek and support legislation, regulation and/or other national, state, and local measures to restrict the sale of flavors and flavored additives in all cannabis formulations, synthetic cannabis and hemp-derived products with psychoactive cannabinoids designed to appeal to youth; and be it further

RESOLVED That the California State PTA and its units, councils and districts seek and support legislation to protect youth by encouraging the adherence to safety messaging about the risks of youth cannabis use in: manufacturers' marketing, social media and in dispensaries and/or any location where cannabis products are sold and to discourage cannabis smoking lounges at all-age events and cannabis smoking in restaurants and cafes; and be it further

RESOLVED That California State PTA and its units, councils and districts support community education about state, regional and local regulations concerning the location and density of licensed and unlicensed storefront cannabis dispensaries in relation to schools, playgrounds and other youth-oriented facilities to discourage the normalization of early cannabis access and use; and be it further,

RESOLVED That the California State PTA submit this resolution to the National PTA for consideration by the delegates at the convention.

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Background Summary

More than half of young adults in the US use cannabis by age 21, more than half of high school students believe that cannabis is not dangerous and 78% of 12th graders say that cannabis is easy to obtain. THC (the psychoactive component of hemp and cannabis) levels have increased significantly over the last 40 years, with many formulations including shatter, dabs, vapes, waxes, resins, edibles and oils, containing as much as 80-99% THC, with high-potency THC dominating cannabis markets.

The younger the age, and the earlier the exposure to THC, the greater the risk of addiction, the use of higher potency products and the ill effects of acute and long-term cannabis use. This includes increased cardiovascular events, hyperemesis, impaired driving, cannabis use disorder (CUD), decreased cognition, attention, memory and learning; poor school performance, sleep, coordination and social interactions; increased learning loss, missed school days, depression, anxiety, psychosis, schizophrenia and suicidal ideation, with regular users being seven times more likely to attempt suicide. Frequent use leads to IQ drops, with daily users 60% less likely to graduate from high school and attend college, impacting educational and vocational attainment. Secondhand cannabis smoke, containing several hundred toxic chemicals, carcinogens and fine particulate matter is an additional health concern.

Our vulnerable populations are impacted; the developing adolescent brain is more susceptible to cannabis exposure, increasing risks for impairment, neurocognitive decline and depression that may follow into adulthood. LGBTQ youth are 1.6-2.5 times more likely to use cannabis and be diagnosed with cannabis use disorder (CUD) and pregnant individuals exposing infants in-utero have risk of low birth weight babies with respiratory infections and neurodevelopmental problems at 9 years.

Pediatric cannabis exposure and accidental edible cannabis ingestion by children have increased over a thousand-fold according to Poison Control Center data. Lower socioeconomic status communities often have increased licensed and unlicensed storefront cannabis outlets, with locations disproportionately targeting communities with higher proportions of racial and ethnic minority populations. Outlet density increases the risk and frequency of cannabis use and addiction in students as young as 6th grade.

Product labeling is confusing with no standardized THC dose, limited/no potency or serving size information and products not comparable across different routes of administration. Cannabis is aggressively marketed with packaging and flavors that look and taste like candy and delivery devices designed to appeal to youth. Billboards, cannabis smoking lounges, manufacturer use of social media business pages that encourage youth followers etc., further normalize youth cannabis use. Additionally, the 2018 Farm Bill exempted synthetic cannabinoids and psychoactive hemp-derived products from FDA regulation; cannabis with $\leq$0.3% THC is considered hemp and <0.3% THC is considered cannabis. Mislabeling is very common, with hemp edibles often containing large amounts of THC. With no age restrictions and products sold outside of the legal cannabis market in stores and online, these dangerous products are easily accessible to our youth.

Cannabis is a public health concern for our youth; PTA must use a collective voice to educate our communities on the dangers and act.

CANNABIS

Calif. pot shops owe $1.3 billion in back taxes as panic grows over industrywide solvency

One pot shop owner said the entire industry is "teetering on the edge."

Rose Harless smokes a marijuana joint in the consumption lounge at the Vapor Room, a cannabis dispensary on Ninth Street just south of Market Street, in San Francisco, on Dec. 4, 2024.
Douglas Zimmerman/SFGATE

By **Lester Black**, *Cannabis editor*

Dec 9, 2024

Sar dispensary has faced plenty of foes since it opened in 2003. It brawled in federal courtrooms with the IRS and was hit during crackdowns by the U.S. Justice Department. But now that weed is legal, it appears the one thing the storied dispensary can't survive is California's legal weed market.

The dispensary is at risk of going out of business because of $250,000 in tax debt it owes to the state of California, according to founder Martin Olive. He blamed the pot shop's tough financial situation on slumping sales caused by street problems in his SoMa neighborhood, as well as high cannabis taxes and penalties from the state.

"We're at a crunch point now where things are looking more dire than they've ever been," Olive wrote in a LinkedIn post last week where he called for "lenders, credit lines, investors, angels, and/ or a miracle to get us out of some critical debt."

The Vapor Room's problems come as cannabis businesses across the state struggle to stay alive, with thousands of companies going out of business and taxes going unpaid. The industry owes the state nearly $1.3 billion in late taxes and penalties, according to the California Department of Tax and Fee Administration.

High cannabis taxes are frequently blamed for making the state's legal pot industry unsustainable, yet state tax rates are set to move even higher. Come July, the state plans to increase cannabis excise taxes by 25%, a prospect that is sending panic across the industry, with some warning that it could be the "nail in the coffin" for many legal weed businesses.

The exterior of the Vapor Room, a cannabis dispensary on Ninth Street just south of Market Street, in San Francisco, on Dec. 4, 2024.
Douglas Zimmerman/SFGATE

"We're already teetering on the edge. A tax increase is going to kill us," said Jerred Kiloh, the owner of the Higher Path Dispensary in Los Angeles.

'You're basically charged more than what you owe'

Cannabis companies across California have been struggling for years to stay profitable, thanks in part to an extremely difficult business environment. The costs of running a pot company are astronomically high compared with most businesses, with companies facing expensive regulations, banking fees and security.

Just as costs continue to rise, revenues are also taking a hit as wholesale

prices for pot plummet and legal cannabis sales decline year over year. Legal cannabis sales in California have been dropping for the past three years, and that's particularly true in San Francisco, where per capita cannabis sales have declined over 34% since 2021.

Businesses like the Vapor Room are left squeezed in the middle between rising costs and falling revenue with no profit left over to survive. Olive said he's prioritized paying his employees and his vendors, which has left him unable to fully pay his state tax bill.

That bill has grown even larger because California has a particularly punitive tax law for cannabis businesses. Most companies face a 10% penalty if they don't pay their taxes on time, but cannabis businesses face a 50% penalty if they're late. Olive said the principal he owes is roughly $125,000, a fraction of his total $250,000 bill to the state.

Some of the flower cannabis items for sale at the Vapor Room, a cannabis dispensary on Ninth Street just south of Market Street, in San Francisco, on Dec. 4, 2024.
Douglas Zimmerman/SFGATE

Olive said this penalty makes it nearly impossible to get out of tax debt.

"You're basically charged more than what you owe," Olive said. "It compounds, which makes it completely overwhelming to catch up."

Olive also blamed local problems in his shop's SoMa neighborhood, which saw decreased foot traffic after tech workers left the downtown core of San Francisco during the pandemic, and an increase in street disorder filled the void.

"We've been beset by illicit drug sales outside in our neighborhood," Olive said. "There's been a real lack of support in the community. I'm sympathetic to what people are going through with addiction, but it's made it very difficult to operate."

A growing problem

The Vapor Room is far from the only pot shop in California that owes the state taxes.

Cannabis companies owe the state nearly $1.3 billion in unpaid taxes and

penalties as of Oct. 31, according to data shared with SFGATE by the Department of Tax and Fee Administration. The agency said "a large portion" of that total is due to penalties and interest on unpaid taxes.

A customer buys cannabis products at the Vapor Room, a cannabis dispensary on Ninth Street just south of Market Street, in San Francisco, on Dec. 4, 2024.
Douglas Zimmerman/SFGATE

Industry observers have been saying for years that the industry couldn't support California's tax rates, especially after a 2023 law changed how taxes were calculated and collected. One observer told SFGATE at the time that the shift would cause an "extinction event," with pot shops unable to pay their taxes and then getting knocked out by the state's mandatory 50% penalty.

That "extinction event" could be unfolding, with widespread company failures in recent years, including the largest pot distributor and the largest delivery company in the state and thousands of pot farms. It's not clear how many pot stores are at risk of closing. The Department of Tax and Fee

Administration said it cannot calculate how many cannabis retailers are behind on their taxes because "a single taxpayer may have multiple liabilities for one or more periods or for multiple taxes."

However, the unpaid tax bills continue to increase. Not including interest and penalties, pot companies owed the state $354 million in taxes on Nov. 18, which is up from $287 million in back taxes in February of this year.

Tax hike coming

Ironically, the tax rates themselves could be partially blamed for the taxman not getting paid.

Legal cannabis taxes, which can climb over 40% in some jurisdictions in California, make legal cannabis more expensive than illicit market weed. California's illegal market is thriving, and many observers say that's because

customers are balking at paying legal prices when they can find cheaper weed outside licensed stores.

Some of the flower cannabis items for sale at the Vapor Room, a cannabis dispensary on Ninth Street just south of Market Street, in San Francisco, on Dec. 4, 2024.
Douglas Zimmerman/SFGATE

Kiloh, the Los Angeles pot shop owner, said this is particularly true for

younger people who will "just go to the cheapest price."

"You have a very nimble demographic in the under-35 demographic that is just one Instagram post away from leaving the legal industry," Kiloh said.

That problem could get even worse this summer when the state plans to increase the cannabis tax rate from 15% to 19% in July, which will be added to a list of other local and state taxes. Kiloh estimated that the increase will push cannabis taxes to over 50% in Los Angeles, where there's an additional 10% sales tax. Kiloh said that would be the "tipping point" that will destroy even more legal businesses.

For Olive, it's not clear if he can hold on to his Vapor Room until the summer. He is organizing an auction to raise funds to keep his shop alive while he negotiates with the state to try to get on a tax payment plan.

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Dec 9, 2024

Lester Black
CANNABIS EDITOR

Lester Black is SFGATE's cannabis editor. He was born in Torrance, raised in Seattle, and has written for FiveThirtyEight.com, High Country News, The Guardian, The Albuquerque Journal, The Tennessean, and many other publications. He was previously the cannabis columnist for The Stranger.

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Flower: 31% THC

Vape: 93% THC

100 mg THC in 2 oz.

Shatter: > 90% THC

REPORT AND RECOMMENDATIONS OF THE HIGH POTENCY CANNABIS THINK TANK TO THE STATE OF CALIFORNIA

October 30, 2024

Prepared by an independent scientific committee convened by the California Department of Public Health

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This report was prepared by a committee of scientists and medical experts convened by the California Department of Public Health, in response to a Resolution of the Department of Cannabis Control's Cannabis Advisory Committee and a Governor's Directive to provide analysis of the problem of increasing potency of cannabis and cannabis products and to formulate recommendations to address it. The group was also asked to prepare input on implementation of a new legislative requirement (SB540) for consumer information on the issue. The Committee proposed preparing an independent scientific report based on the scientific literature and knowledge of existing policy. This report and its recommendations represent the independent consensus of the scientific committee and do not necessarily represent the official views of, nor an endorsement by, the California Department of Public Health, the California Department of Cannabis Control, or the California State Government.

Acknowledgements: We wish to thank the staff of the California Department of Public Health that convened the Committee and supported our meetings. We would also like to thank the group of 21 external scientific experts who were invited to anonymously contribute to the Delphi panel consultation. We appreciate the assistance of Allison Temourian, PhD. at UCSF and Kiara Gonzalez Garcia at PHI, who supported report formatting. The Committee was co-chaired by members Silver and Allen.

EXECUTIVE SUMMARY

Cannabis "potency" is colloquially used to refer to the concentration (%) or dose (mg) of Δ9-tetrahydrocannabinol (THC) present in cannabis or cannabis products.[1] The potency of legal herbal cannabis (flower) sold in California today is now five to ten-fold the level found nationally in cannabis studied in the 1970s and 80s. Today, most flower and flower products sold by legal California retailers tests at 20% to 24% THC or greater. A wide range of manufactured solid and liquid chemical extract products of up to 99% THC are now sold as vaping liquids, shatter, waxes, or other concentrates or are used in edibles. THC is the primary psychoactive and intoxicating constituent of the cannabis plant. It is the main reason people turn to cannabis for pleasure and to seek relief of certain ills, and yet also the component most associated with adverse effects.

In the summer of 2023, the California Department of Public Health (CDPH) Substance and Addiction Prevention Branch (SAPB) convened a multidisciplinary group of cannabis experts, the High Potency Cannabis Think Tank, (heretofore referred to as "the Committee") to study high potency cannabis. This followed on a 2020 recommendation of the Department of Cannabis Control's Cannabis Advisory Committee that CDPH convene a scientific task force to review the consequences of high potency cannabis and a 2022 directive from Governor Newsom to convene subject matter experts to study the issue. Our key task was to review the research on high potency cannabis and develop policy recommendations to reduce adverse health outcomes related to high potency cannabis in the adult use cannabis market. This report does not focus on the legal medical cannabis market, illicit cannabis, or hemp. The Committee conducted this work using a modified Delphi process, involving iterative rounds of quantitative and qualitative data collection, followed by discussion. This report is the product of that process.

Evidence reviewed by the Committee finds that there is a pattern of increasing risk with increases in THC concentration. The higher the levels of THC in cannabis and cannabis products, the higher the risk of experiencing adverse events and cannabis use disorder. Adverse events may be immediate or acute or the result of longer-term or prolonged use. Adverse events are more common and can be more intense when cannabis consumed contains 10% THC or more in inhaled products, or 10 mg THC or more in edible products. Frequent use, especially daily or near-daily consumption (20+ days per month) increases the risk of both acute adverse events as well as adverse events associated with prolonged use. Use of high potency cannabis increases risks both independently and in conjunction with factors such as frequency of use and individual vulnerabilities, including genetic predisposition to certain mental health conditions, as well as social determinants of health such as access to healthcare adverse childhood experiences, and exposure to racism. By promoting more frequent and problem use, aggressive production and marketing of high potency products indirectly elevate the risk of other adverse effects by making it harder for individuals to moderate or cease use. Cannabis use disorder, itself an adverse outcome, promotes a cycle of heavy use, leading to further adverse outcomes.

Rates of frequent and daily use of cannabis, as well as use during pregnancy, have risen dramatically in recent decades, and the number of people who use cannabis daily now surpasses the number of people who drink alcohol daily seven-fold.

Use of high potency cannabis may be especially harmful for certain populations, including people under the age of 26 whose brains are still maturing, those who are pregnant and their infants, and people with a

[1] This is done using a formula that includes the precursor tetrahydrocannabinolic acid or THCa.

personal or family history of mental health conditions or substance use disorders. These adverse outcomes have a high human and financial cost to individuals, families, government, and society at large that often passes unperceived.

Given the migration of the California market to high and very high potency cannabis, strategies to mitigate adverse health, educational, and social impacts must be holistic. These strategies should not only address the potency of the products themselves but also focus on increasing public awareness, promoting safer use, and reducing exposure among the highest-risk groups.

The Committee recommends twenty interdisciplinary policies that have the potential to reduce adverse health outcomes related to high potency cannabis (Table 1). A set of the "top ten" policies in terms of their likely impact on adverse outcomes are highlighted in green. These policy recommendations are based on the existing body of scientific research, experience to date in cannabis markets, and our collective professional experience. They take into consideration policies that have been adopted by other states and countries. In developing the recommendations, we sought policies that would not contribute to stigma related to cannabis use, nor recreate past inequitable patterns of penalization, focusing primarily on addressing the supply side, pricing, and educating consumers. We also aimed to be realistic about the status of California's legal retail market, where almost the entire market is now composed of high potency products; seeking policies that are feasible to implement, most of which have been implemented elsewhere. Where possible we recommend policies that will reduce adverse health outcomes by discouraging products with excessive levels of THC and incentivizing the availability of lower THC retail offerings. Throughout, our priority was to recommend policies to protect young people, people who are pregnant, and people with a personal or family history of mental health conditions or substance use disorders.

Control policies for illicit drugs focus on criminal sanctions for sales, possession, and use, whereas control policies for legal drugs focus on product regulations, marketing, sales policies, information, and taxation. Given that cannabis is now legal in California, it is an appropriate time to review initial regulatory policies aimed at establishing the legal market with a greater focus on ensuring the health and safety of consumers.

Recommended policies are related to marketing and advertising; product requirements; the retail environment; taxation and pricing; attractiveness to children, packaging, labeling, and consumer information; public education; and compliance screening, data collection, and research and evaluation. "Cannabis product" in California means cannabis that has undergone a process whereby the plant material has been transformed into a concentrate. This refers to edibles, vape oils, other concentrates, infused pre-rolls, and other products. Our recommended approach also includes funding of evaluation research and epidemiologic surveillance alongside policy implementation, to assess the effect of cannabis policy on adverse health outcomes from high potency cannabis and inform future steps. Similar approaches have led to historic declines in alcohol and tobacco use by adolescents.

We recognize that the recommended policies differ in their cost and technical complexity. Yet, once implemented, many have little ongoing cost to government, whereas the costs of inaction are substantial and continuous. Each of these policies has value to protect public health and youth.

The state may experience pushback in working to implement these policies from those who say that the available evidence is not sufficient to support their implementation. We acknowledge that the body of evidence in support of these policies is still emerging, although copious evidence exists from tobacco and

alcohol control for some recommendations. This reflects the rapidly shifting product and policy landscape characterizing cannabis in the United States. However, continuing to choose not to act is as much a policy choice as implementing new policies, and one with significant negative implications for mental health, substance use disorders, and other areas.

We have passively allowed the shift of our cannabis markets to far more potent products likely to cause significantly greater harm. It is time to change course and acknowledge that not all substances that can be derived from cannabis can be treated as safe consumer products. As a state, we have an interest in building a safer legal cannabis market for the long-term, one in which well-informed consumers can have greater confidence, and which provides legal access to products, packaging, and marketing less likely to induce harmful patterns of use, dependency or other harms.

We urge the State of California, including its cannabis regulatory agency, state legislature, public health agency, and taxation authorities to work together to immediately implement as many of these policies as possible.

Table 1. *Recommended Policies to Reduce Adverse Health Outcomes Associated with High Potency Cannabis*

Recommended Policies to Reduce Adverse Health Outcomes Associated with High Potency Cannabis "Top ten" policies in terms of their likely impact are marked in green
Marketing and Advertising
Prohibit cannabis and cannabis product advertising on billboards, and any other general public-facing advertising (Because billboard advertising reaches children, and because a high percentage of the market is high potency).
Restrict advertising of cannabis flower with over 20% THC or cannabis products with over 35% THC to simple plain text only.
Product Requirements
Limit manufacture and sale of high THC products. Specifically: Prohibit the sale of liquid or solid concentrates for inhalation (e.g. dabs, wax, shatter) with THC content above 60% and implement careful oversight of allowable vehicles and diluents to ensure safety. Prohibit the sale of cannabis flower with THC content above 25% and prohibit the infusion of additional THC (or other psychoactive cannabinoids) into flower or pre-rolls. Limit edible products to a maximum of one 10 mg THC dose per physical piece or liquid beverage container (excluding tinctures).
Prohibit the use of added flavors (including fruits, mint, menthol, vanilla, chocolate, spices, and other common food flavors) in all inhaled products, whether natural or synthetic. Additionally, prohibit language and images that could lead consumers to believe the product has flavors other than those of cannabis. At a minimum, this should apply to flower or pre-rolls with THC content above 20% and other inhaled products with THC content above 35%.
Retail Environment
Require retailers to offer lower dose options for flower (<10% THC) and edibles (5 mg or less), including products which are more suitable for medical use.
Consider testing, promoting, or facilitating a Quebec-style public monopoly approach to cannabis sales, particularly in jurisdictions that have not yet legalized cannabis sales.

Require more robust age-gating for websites, online sales, and other online content, including independent third-party verification of identification before entry and sale.

Taxation and Pricing

Restructure state excise taxation on adult-use cannabis to be proportional to the milligrams of THC in the taxed product, applicable to all cannabis products.

> Ensure that the restructuring maintains or increases cannabis tax revenue in line with the goals established by Assembly Bill 195 (Chapter 56, Statutes of 2022, a legislative commitment to replace revenue lost from the cultivation tax cut by 2026).

Prohibit discounting or promotion of flower >20% THC or other inhaled products over>35% THC.

Attractiveness to Children, Packaging, Labeling, and Consumer Information

Enforce existing laws and regulations that prohibit products that are attractive to children and restrict flavored additives in inhaled cannabis products.

Require plain packaging for all cannabis products with flower THC content above 20%, inhaled products exceeding 35% THC, and edibles containing more than 10 mg of THC per individual piece or liquid container, if permitted. Ideally, this should extend to all cannabis products.

Require clear standard information on the number of standard doses in a package on all cannabis and cannabis product packaging, based on a standard dose of 5 mg THC.

Strengthen regulations with clearer, evidence-based criteria for identifying and prohibiting products, packaging, marketing, and advertising characteristics that appeal to children and youth.

Require prominent, rotating, graphic front-of-pack health warning labels on cannabis products and on advertising, including specific warnings about high potency THC, such as risks of dependency and mental health harms. Health warnings should cover at least one-third of the front-of-pack and 15% of any print advertisement surface, with clear contrast between the warnings and the background.

> *Examples: "WARNING: Cannabis use may contribute to mental health problems, including serious mental health conditions. Risk is greatest for people who use frequently and when using products with high THC levels; "WARNING: The higher the THC content, the more likely you are to experience adverse effects and impairment. THC may cause severe anxiety and disrupt memory and concentration; "WARNING: Prolonged use of cannabis products high in THC may cause recurrent, severe nausea and vomiting."*

Adopt this Committee's recommendations for implementing SB540 requirements

Public Education

Fund and implement public education campaigns on the risks of high potency cannabis, including mental health risks. Allocate additional funds from Tier 3 of cannabis tax revenue (without reducing the Elevate Youth program) to the CDPH, totaling $10 million or more per year beyond their current allocation. These funds should be used to enhance high-quality cannabis prevention education campaigns, including those focused on high potency messaging, as well as supportive formative research and testing of messaging. Prioritize campaigns addressing use during pregnancy, drugged driving, and education for youth and seniors.

Compliance Screening, Data Collection, Research, and Evaluation

The Department of Cannabis Control and the state budget should allocate funds from the regulatory tier of taxation to establish a pre-market product and packaging review team. This team would screen new products for compliance with these recommendations (if accepted), existing regulations, and attractiveness to children. The team should also review all existing products within two years. Priority should be given to inhaled products with over 50% THC, followed by cannabis flower with over 20% THC, and edibles with more than one dose in a single container or physical piece.

Fund and ensure the tracking and regular reporting of negative health outcomes associated with high potency products in California hospitals, hospital emergency departments, and ambulatory care settings. Surveillance

systems should include the type and potency of marketed products as required data elements. Additionally, incentivize increased screening to more clearly document the product type used in clinical services and poison control cases.

The Administration and the DCC should support making the current Prop 64 requirement of at least $10 million in annual cannabis tax revenue for research an ongoing budgetary commitment. This funding should maintain a focus on research on health outcomes and policies related to cannabis potency. The requirement, currently set from 2018 to 2028, should be extended beyond 2028 and adjusted for inflation.

Provide additional funding in the 2024 budget to the University of California Office of the President to support scientific advice and testing related to the implementation of SB540. This funding should include support for developing additional warning messages, such as those regarding high potency, and for creating and evaluating SB540 retailer flyer language. Additionally, allocate funding for similar support every five years for re-evaluating messaging and message design, adjusted for inflation.

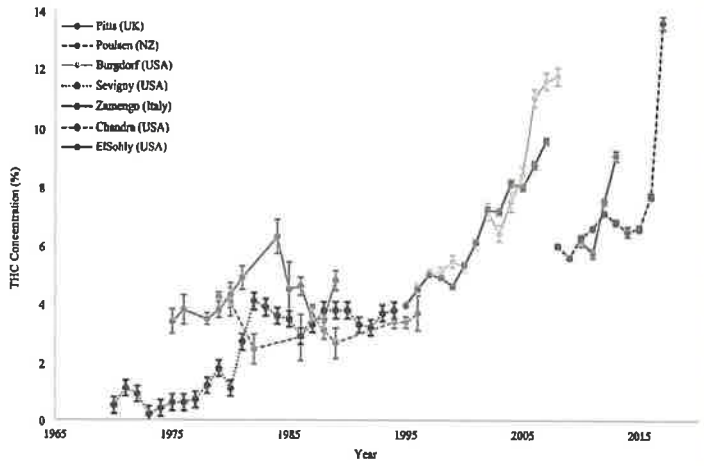
BACKGROUND

Cannabis potency is colloquially defined as the concentration (%) or dose (mg) of Δ9-tetrahydrocannabinol (THC) present in cannabis or cannabis products. THC is the primary psychoactive and intoxicating constituent of the cannabis plant. Since 1970, the potency of cannabis available in the United States has increased, which in turn increases the risk of adverse health outcomes for people who use cannabis. This report summarizes data on the increasing potency of cannabis, describes adverse outcomes from the use of high potency cannabis, and provides policy recommendations to reduce harm from the use of high potency cannabis.

California legalized medical cannabis in 1996, with successive decriminalization steps prior to full adult-use legalization in 2016 with the passage of Proposition 64. Adult-use commercial sales began in 2018. During those years, the U.S. and California cannabis markets changed dramatically. In the 1970s and 80s, the cannabis market was dominated by herbal cannabis with a THC content of 1.5% to 5%.[1] In recent decades, the herbal cannabis market has been profoundly transformed by the move to almost exclusive cultivation of "sinsemilla," flowers of the female plant, which are bred for higher THC content and replaced traditional low THC herbal cannabis.

Between 1970 and 2017, THC concentrations in herbal cannabis increased by 0.29% each year, (Figure 1) whereas in cannabis resin, THC concentrations increased twice as fast, by 0.57% each year (Figure 2).

Figure 1. *Mean (standard error) concentrations of delta-9-tetrahydrocannabinol (THC) in all herbal cannabis over time.*[4]

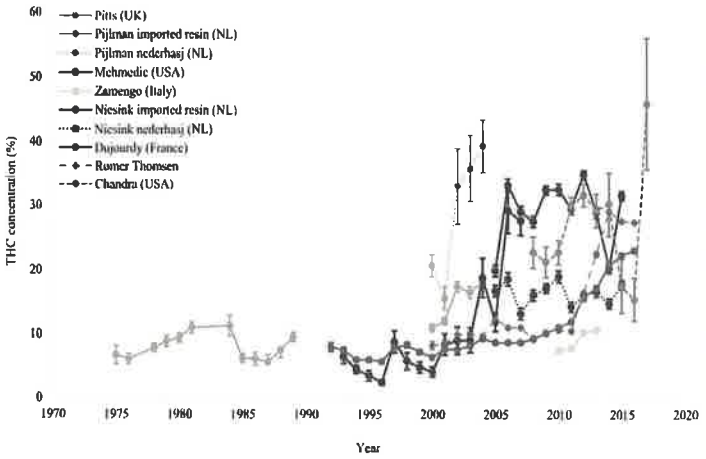


Reproduced from Freeman TP, Craft S, Wilson J, et al. Changes in delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) concentrations in cannabis over time: systematic review and meta-analysis. Addiction.

Even the striking increases visible in global and national data through 2017 (Figures 1 and 2) do not capture the current California market trend, where average THC content of flower and concentrates or resins are now significantly higher. The 2024 study by Geweda et al,[2] randomly sampled and tested legal cannabis flower products in 4 states, with 68 California samples taken from San Diego and Central Valley retailers. Samples averaged 21% THC in San Diego and 24% THC in the Central Valley. Of the 68 California samples, only 23 were below 20% THC, and none were below 10% THC. Although most of the cannabis labels studied showed inflated THC levels (for example, only two of the 23 California samples below 20% THC were labeled as such), this study confirmed that values of THC exceeded by as much as ten-fold the strength of 1970s cannabis. Today, it is difficult to find traditional herbal cannabis below 10% THC at a California cannabis retailer. These more potent products lead to significant increases in THC exposure. One study found that the total amount of THC consumed in one episode of use of flower nearly doubled when using flower with 24% THC (58mg) relative to flower with 16% THC (30mg).[3] THC blood levels for both conditions were notably higher than those previously documented with lower potency flower.[3]

In contrast to THC, globally, cannabidiol (CBD), the main non-intoxicating cannabinoid content in herbal cannabis and cannabis resin did not change.[4] However, in U.S. markets specifically, CBD content in seized cannabis declined and remained low through at least 2017 before starting to rise[5,6]. Coupled with the rise in THC content in herbal cannabis samples from less than 1.5% in 1980 to 12% by 2012 in the U.S., [5,7] this has meant a larger increase in THC:CBD ratios in the U.S. marketplace, to the point where in the vast majority of commercial products CBD is present only in pharmacologically negligible amounts.

Figure 2. *Mean (standard error) concentrations of delta-9-tetrahydrocannabinol (THC) in cannabis resin over time.*[4]



Reproduced from Freeman TP, Craft S, Wilson J, et al. Changes in delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) concentrations in cannabis over time: systematic review and meta-analysis. Addiction.

At the same time, the legal cannabis market diversified and began to mass-produce and intensively market a wide range of products, many of which did not exist before 2000. "Cannabis product" in California means cannabis that has undergone a process whereby the plant material has been transformed into a concentrate. This refers to edibles, vape oils, other concentrates, infused pre-rolls, and other products, whereas "cannabis" refers both to the entire market, and to herbal cannabis specifically. While mechanically extracted higher potency products such as hash oil had long been available, chemical extraction with butane and other solvents became routine. It led to the growth of the ultra-high potency manufactured products market (Figure 2). Generally, ultra-high potency in cannabis refers to very elevated concentrations of delta-9-tetrahydrocannabinol (for example 60-99% in cannabis products). Of concern, we are also now seeing the proliferation of illegal high potency products containing other psychoactive cannabinoids most often synthetically derived from CBD in hemp, such as delta-8 THC, Hexahydrocannabinol (HHC), and others.[8]

Marketed products now include a wide range of extracts meant to be used for inhalation that have a very high THC content, far beyond that naturally produced by the plant. The THC content of preloaded vaping cartridges, often marketed with flavors or with names or images explicitly or implicitly suggesting non-cannabis flavors, has gradually risen into the 80-90% THC range. These products are disproportionately purchased by youth[9] who value the ability to conceal them more easily and their ease of administration. Inhaling resins extracted from the cannabis plant with very high THC concentrations through "dabbing" is on the rise. These extracts come in various forms, such as *hash oil or honey oil*—a gooey liquid, *wax* or *budder*—a soft solid with a texture like lip balm, and *shatter*—a hard, amber-colored solid. While a decade ago, many concentrates were in the 50%THC range, today, many exceed 90% or even reach 99% THC. Dabbing typically provides a much higher dose per inhalation than smoking or vaping. For example, 90 mg THC was the typical ingestion in a study of people dabbing 70% and 90% THC concentrates, and blood levels were over twice those of the participants using herbal cannabis.[3] Many retailers sell pre-rolls of cannabis flower that are infused with THC concentrate, one of the market's fastest-growing segments.[10] This can typically drive potency of these products up to 45% THC.

The commercial edibles market has also expanded. While a couple of U.S. states started requiring demarcation with 5 mg THC single servings and with packages containing no more than 50 mg THC, most states, including California, have adopted policies mandating no more than 10 mg THC single serving demarcations and allowing up to 100 mg THC per package. Canada, on the other hand, does not allow more than 10mg in a full edible package. California's edible package limit is 10 times Canada's maximum package limit. California has also allowed products such as small beverage containers with 100 mg THC or a single scored cookie or bar with 100 mg THC, where demarcation is difficult to see.

An international group of scholars has proposed 5 mg of THC as a standard unit dose of cannabis to guide consumers and promote safer use, although people who use cannabis frequently prefer higher amounts.[11] NIH has also recommended 5 mg THC as a reference dose to improve the ability to interpret and compare research findings.[12] People who are inexperienced with cannabis are encouraged to start with lower doses. Canada is examining a standard reference dose which was also a recommendation of its five-year review process.[13] Typical starting medical doses are 2.1-2.5mg, the amounts in the FDA-approved medications Syndros and Marinol (range 2.5-10 mg).

Challenges for Research

Most research on the safety and health effects of cannabis does not fully reflect large-scale industrial diversification and market changes. While recent epidemiological studies on issues such as cannabis use disorder, daily or near daily use, emergency room visits, or unintentional ingestion or poisoning reports reflect real world use, experimental studies have mostly been limited to products obtained from sources authorized by the federal government, which have a far lower THC content and thus do not accurately reflect the range of products that are available on the market. For example, we searched the literature for experimental studies on dabbing and butane hash oil products but found only a few epidemiological surveys, case reports on toxicological effects, and non-placebo controlled naturalistic studies. Nevertheless, there is an emerging body of literature on the effects of higher potency THC, much of it focused on mental health effects and dependency.

Clinicians and scientists have called attention to the strong reasons for concern about this striking market trend for over 15 years, including in the National Academy of Science, Engineering and Medicine's (NASEM) landmark 2017 report on the health effects of cannabis.[14] The new 2024 NASEM report on the public health and equity consequences of cannabis policy notes that "*One of the most prominent public health concerns related to cannabis policy is the rise of high-concentration and high-potency THC products. The risks associated with THC consumption increase as the dose increases, and legalizing products that deliver high doses potentially increases adverse cannabis-related harms.*"[15]

Law and Regulation Treating All Cannabis "the same"

Despite these changes, our legal and regulatory systems – from the federal Controlled Substances Act of 1970 to local law – largely continue to treat all products derived from cannabis similarly – from the traditional herbal cannabis to 99% THC concentrates. Only some regulations speak to particular products by type (e.g. clean indoor air laws may treat smoked versus vaped or edible cannabis differently, and there are THC total mg limits for edible and concentrate packages). Irrespective of potency, manufacturers are typically permitted to launch whatever products they see fit within very broad guidance. Product characteristics associated with more harmful use, such as attractiveness to children, flavors known to appeal to youth, or

elevated potency, have not, to our knowledge, been prioritized for robust regulatory action or enforcement. By contrast, standards for contaminants were rapidly implemented and limited regulation of flavored additives was added in 2022 in California. Only a few states, such as Connecticut, Vermont, Colorado and a handful of California local governments, including Watsonville, Contra Costa County, Grass Valley, and Cathedral City, have sought to address the problem through tax structure, potency caps, product limits, plain packaging, or warnings.

Since the inception of California's regulatory process in 2017, public health and substance use disorder experts have consistently advocated for limits on potency, health warnings, and potency-based taxes in their formal comments, starting from the initial creation of the adult-use market and the first set of emergency regulations through each set of relevant rulemaking. For example, during the initial set of proposed emergency regulations for the launch of the adult-use market in December 2017, UCSF experts recommended a 100 mg THC per package limit on inhaled products, aligning with the limit for edibles. Another comment urged the prohibition of cannabis concentrates or products with over 50% THC content until a thorough risk assessment could be conducted through the normal regulatory process, noting that allowing "access to shatter with 90%+ THC is not an emergency." These concerns were not addressed in the final regulations, nor in subsequent rounds.

In 2019, Proposition 64 required California's Legislative Analyst's Office (LAO) to report with recommendations for adjusting the state's cannabis tax rate to achieve three goals: (1) undercutting illicit market prices, (2) generating sufficient revenue to fund the programs designated by the measure, and (3) discouraging youth use. Their recommendation was: "*We view reducing harmful use as the most compelling reason to levy an excise tax. Accordingly, we recommend that the Legislature replace the existing retail excise tax and cultivation tax with a potency-based or tiered ad valorem tax, as these taxes could reduce harmful use more effectively*" and "*Currently available information suggests that a potency-based tax in the range of $0.006 to $0.009 per milligram of THC could be appropriate.*"[16] Cannabis tax reform in 2022 eliminated the cultivation tax but did not implement either of the LAO's recommended approaches to reduce harmful use.

No further regulatory action on these issues followed, as far as we know. Indeed, the California State Fair awarded a prize for the flower with the highest THC content despite public concerns.[17] In 2022, Senator Richard Pan introduced SB 1097, the Cannabis Right to Know Act, which would have mandated stronger, prominent graphic health warnings on packaging, including potency information, and provided consumers with additional information at the point of sale. However, the bill was stalled before the final vote. In the 2023 legislative session, Senator John Laird's SB 540 passed, requiring the development of point-of-sale information on safer cannabis use, including the risks associated with high potency products and the potential for THC to exacerbate certain mental health conditions, as well as a re-evaluation of current health warning labels.

In 2024, the State legislature approved a request for an audit of cannabis regulatory activities. While primarily focused on products attractive to children, part of the State Auditor's charge was to assess: "*What has DCC [Department of Cannabis Control] done to address the gradual rise of THC content in products which are associated with greater risk of dependency and psychosis for youth?*"

In summary, over the more than six years of California's legal adult-use commercial market, the trend toward higher potency has continued unabated, mirroring national trends. As in many other states, regulatory efforts have focused on establishing complex legal market structures rather than strengthening public health safeguards. As such, California's marketplace has become a leader in aggressively marketed products with very high THC content.

Intoxicating Hemp – Similar Hazards to High Potency Cannabis

While this report is focused on high potency cannabis in the adult-use cannabis market, regulated by the Department of Cannabis Control, the parallel emergence of a major intoxicating hemp market cannot be ignored. Until this month, edible hemp products with more Delta-9-THC then legal cannabis edibles could be legally sold to a 10-year-old in our state at any corner store. There is also a vast market of illegally sold inhalable and edible hemp products with high doses of psychoactive cannabinoids like Delta-8-THC, HHC and THC-P, synthetically derived from CBD in hemp. These often-high concentration products pose an immediate and urgent threat to children and youth and are now the route of initiation for a substantial part of teens using cannabis. [8,18] CDPH has authority to establish non-intoxicating content limits, as was originally the stated intent of the hemp market. Governor Newsom and CDPH issued emergency regulations to address this in September 2024; these regulations are an urgent priority for protecting youth.

Changing Patterns of Harmful Use

Teens and young adults below age 26 are generally considered to be at highest risk for adverse effects of cannabis. While overall cannabis use by teens has declined at the national level, frequency of use amongst teens who use cannabis rose by 26% nationally with onset of adult use retail sales.[19] Similarly, in California, while overall use rates among teens declined between 2015-2022, daily or near daily use has increased since legalization.[20]

Rates of past-year cannabis use in young adults – who are in a critical period when their brains are still developing – are particularly concerning. Nationally, use in the past 12 months has surged from 23.3% in 1991 to 42.4% in 2023 among adults ages 19-30 years. Daily use in this age group has quadrupled, rising from 2.4% in 1991 to 10.4% in 2023. In short, one in ten young American adults now use cannabis nearly every day. Additionally, among adults ages 35 to 50 years, past year and past month cannabis use more than doubled and daily use tripled from 2008 to 2023.[21]

Between 2008 and 2022, days of cannabis use increased 2.3 to 8.1 billion days per year. Whereas the 1992 National Survey on Drug Use and Health recorded 10 times as many people using alcohol daily or near daily relative to cannabis (8.9 vs. 0.9 million), by 2022, for the first time the number of people who use cannabis daily or near daily surpassed the number who use alcohol daily or near daily (17.7 vs. 14.7 million). While far more people drink, high-frequency drinking is less common. In 2022, the median drinker reported drinking on 4–5 days in the past month, versus 15–16 days in the past month for cannabis. In 2022, past-month cannabis consumers were almost four times as likely to report daily or near daily use (42.3% vs. 10.9%) and 7.4 times more likely to report daily use (28.2% vs. 3.8%) as alcohol consumers.[22]

Nationally, cannabis use during pregnancy – a period associated with particularly concerning risks – has more than doubled. From 2002-2003 to 2016-2017 national past-month cannabis use during pregnancy increased from 3.4% to 7.0% overall and from 5.7% to 12.1% during the first trimester. Past-month daily or near daily cannabis use during pregnancy tripled from 0.9% to 3.4% overall and quintupled from 0.5% to

2.5% during the third trimester.[23] In Northern California Kaiser Permanente patients the prevalence of prenatal cannabis use increased from 5.5% in 2012 to 9.0% in 2022, with striking differences in prevalence by age, race and ethnicity.[24,25]

Although many factors have changed, from social media to pandemics, striking trends of steadily increasing rates of frequent or problematic cannabis use among teens, young adults, older adults, and during pregnancy have occurred alongside the significant rise in cannabis potency.

It's Time to Revisit the Problem

On September 25, 2020, the Department of Cannabis Control's Cannabis Advisory Committee unanimously passed a resolution recommending that:

> *"[...]CDPH request and support the Office of the President of the University of California to convene an expert scientific task force, exempt from conflicts of interest, to review the scientific literature on the issue of increasingly high potency (THC content) of cannabis and cannabis products, the state of the science on health implications of increasing potency (for example, but without limitation, upon dependency, mental health, drugged driving, and health benefits), present a summary of the scientific data and make public health recommendations to cannabis regulatory agencies and to the public."* [26]

On September 18, 2022, California Governor Newsom issued a directive stating:

> *"To expedite policy reforms that prioritize and protect California consumers' health and safety, the Governor has directed the California Department of Public Health to convene subject matter experts to survey current scientific research and policy mechanisms to address the growing emergence of high-potency cannabis and hemp products"* [27]

During this period, the Newsom Administration, recognizing the growing crisis in youth mental health, its inequitable impacts on young people of color, LGBTQ+ youth and youth in under-resourced communities, also launched the Children and Youth Behavioral Health Initiative to meet the needs of kids and families, taking a "whole child" approach to address the factors that contribute to mental health and well-being of children and youth.

One factor likely contributing to the rising burden of mental health challenges among youth is cannabis use, particularly the growth in frequent use (20+ days per month) of high potency products. Improving cannabis policy offers a unique opportunity to reduce the incidence of preventable mental health issues triggered by cannabis in a modest but significant subset of young people who use it. This has the potential to reduce both serious harms to well-being, and significant preventable costs to families and government.

PROCESS

In the summer of 2023, as the COVID-19 pandemic began to wane, the California Department of Public Health (CDPH) Substance and Addiction Prevention Branch (SAPB) convened a multidisciplinary group of cannabis experts to review research on high potency cannabis. By December 2023, this group developed a plan to synthesize research on high potency cannabis and recommend policies to mitigate harm, particularly among youth, pregnant or breastfeeding individuals, and those vulnerable to psychosis or other

serious mental illnesses. The group selected Committee co-chairs, invited additional experts to fill gaps in representation, and chose a modified Delphi method[28] to develop their recommendations. The final Committee comprised 13 individuals with expertise in cannabis research, economics, health policy, public health, substance use disorder psychiatry, pediatrics, regulatory science, neuropsychopharmacology, pharmacology of substance use disorder, toxicology, health communication, and other relevant fields (see Appendix B). Two Committee scientists had been members of the National Academies of Science, Engineering and Medicine (NASEM) landmark 2017 review of the therapeutic and adverse Health Effects of Cannabis and Cannabinoids. Three are members of the current 2024 NASEM review of the Public Health Consequences of Changes in the Cannabis Policy Landscape, where leading scientists from around the world presented and an extensive review of relevant research was carried out. Their deep expertise from those experiences helped inform the group's work.

The Committee decided to prioritize addressing high potency in the adult-use cannabis market while indicating a willingness to explore issues related to the medical market in a separate report, and also recognized the problems posed by intoxicating hemp products.[29] Given that the majority of cannabis sales and usage are in the adult-use market, and most adverse outcomes are associated with adult-use cannabis, focusing on this area was deemed the most urgent starting point. Other states, such as Colorado and funded research groups were also reviewing the medical use issues, and the group did not wish to duplicate those efforts.

No funding was provided for the activities of the Committee, which worked in a volunteer capacity.

The Committee met approximately once a month from December 2023 through August 2024 via Zoom. The first step was to develop a working definition of high potency cannabis. The second step involved identifying health and intermediate outcomes that the proposed policies should aim to achieve. The group then created a 'library' of potential policies related to high-THC cannabis, drawing on recommendations from participating scientists, peer-reviewed publications, reports, professional experience, cannabis laws and policies from other U.S. states and countries, and regulatory science from other substances, particularly tobacco.

What is the Delphi Method?

Delphi is a research method designed to gather information from a group of experts to make decisions or develop recommendations. This approach is especially useful in cases in which the existing research is limited or emerging. This process involves eliciting expert input using a series of anonymous surveys, reporting the findings back to the group, and allowing experts the opportunity to adjust their input in response to that of their peers.

The modified Delphi process involved iterative rounds of quantitative and qualitative data collection. In Round 1, the focus was on assessing the expected impact on desired outcomes and feasibility, while Round 2 prioritized these findings and allowed for comments, suggestions, and additional proposals. Committee members provided input through an anonymous online survey. Twenty-one external scientific experts were invited by the Committee members to participate, and their feedback was reviewed in subsequent Committee meetings.

These meetings centered on discussing survey results and refining policy proposals. The iterative process facilitated interdisciplinary learning and refinement of the policies under consideration. The Committee used surveys and discussions to refine the working definition of high potency THC products, prioritize outcomes related to their use, and frame and contextualize policy recommendations.

While all Committee members contributed to the policy recommendations, this report represents a consensus statement reflecting what the members collectively agreed to put forward. Individual members may have had different preferences for specific details or priorities, so the recommendations represent the expertise of the Committee as a whole, rather than the views of any single member.

DEFINING THE PROBLEM: WHAT IS THE CHALLENGE OF HIGH POTENCY CANNABIS?

In defining the problem of 'high potency cannabis' and developing a policy approach, the Committee considered both dichotomous and continuous definitions. Each approach has benefits and drawbacks. A dichotomous approach would establish a specific threshold, above which cannabis is considered high potency and below which it is not. This type of definition may be easier to understand, communicate to the public, and apply in targeted policies.

Table 2. *Dichotomous versus Continuous Approaches to the Problem of High potency Cannabis*

Dichotomous Approach	*Continuous Approach*
Easier to understand and communicate to the public	More challenging to understand and communicate to the public
Insufficiently captures drivers of THC intake in real-world cannabis use	Better reflects real-world cannabis use and how product design and use interact to impact total THC intake and adverse effects
Cutoffs capture only part of increased risk, since increases in risk begin at or below current market characteristics.	More consistent with the evidence

After thorough debate, the group concluded that limiting the discussion to a dichotomous definition of 'high potency cannabis' would oversimplify the issue. There is a pattern of increasing risk with increases in THC concentration, even at THC concentrations as low as 10% THC (and lower) in flower and with other higher potency products; risk rises in a dose-dependent manner. Currently, cannabis and cannabis products exceeding these levels, which are already far higher than the amount found in the cannabis available in the 1970s-1990s, now heavily dominate the California market, except for a small segment of CBD-predominant products. High levels of THC are present across various product types and modes of administration.

The proposed THC thresholds for certain policies in this report are not meant to imply that they represent any scientific consensus that these are safe cut-offs, nor do they constitute a definition of high potency cannabis.

As a society, we allowed these changes to unfold over time and are now grappling with the consequences. Addressing the adverse health outcomes associated with the shift in California's market toward high potency products requires a consumer-focused approach. The Committee recognized the need for a continuous approach to the issue of high potency and a holistic policy framework that encompasses, but is not limited to, policies targeting products above specific THC concentration or content thresholds. While these thresholds may capture some of the increased risk associated with high potency products, they represent a public policy compromise that addresses only part of the problem. Proposed THC thresholds for certain policies are based on a combination of considerations related to what we see in the California

market, what has been adopted as limits in other US states and by other countries with legal markets. They are not meant to imply that they represent any scientific consensus that these are safe cut-offs, nor do they constitute a definition of high potency cannabis.

Committee Problem Statement on High Potency in the Cannabis Market

- The higher the levels of THC in cannabis and cannabis products, the higher the risk of experiencing adverse events and cannabis use disorder. Adverse events may be immediate/acute or the result of longer-term or prolonged use.
- Adverse events are more common and can be more intense when the cannabis consumed contains 10% THC or more in inhaled products, or 10 mg THC or more in edible products. Risk is higher from products that deliver more than 10 mg THC in a single intake episode and increases as the amount of THC delivered rises.
- Frequent use, especially daily or near-daily consumption (20+ days per month), and binge consumption increase the risk of both acute adverse events as well as adverse events associated with prolonged use. These use patterns interact with potency to determine a person's cumulative THC exposure over a given period of time and overall risk of harm.
- Certain groups are particularly vulnerable to adverse effects: most notably those at a young age (26 years and under),[30] infants exposed during pregnancy, and those with a personal or family history of mental health conditions or substance use disorders.
- People who are inexperienced with cannabis may experience adverse effects even at low doses.

ADVERSE EFFECTS OF HIGH POTENCY CANNABIS

To understand the effects of high potency cannabis products, one must first consider the pattern of adverse effects of cannabis in general and of cannabis use disorder.

General Adverse Effects

- Acute effects while under the influence of cannabis include impaired learning and memory, disrupted executive function and perception (leading to problems with driving or operating equipment),[31,32] and, particularly among people who are inexperienced with cannabis, anxiety, and panic.[33,34]
- Relatively common adverse effects of frequent and prolonged cannabis use, even when people are not acutely intoxicated, include cannabis use disorder (evidencing symptoms such as using cannabis despite adverse consequences and physiological dependence) and, less frequently, severe nausea and vomiting (cannabis hyperemesis syndrome).[35,36] Although estimates are still being updated, most recent estimates show cannabis use disorder develops in roughly 20-25% of people who use cannabis, and in 45% of those who started using before age 16.[37] This transition rate is more than double what was observed two decades ago.[38]
- Other serious adverse effects, while less common, also have evidence of association with cannabis use. These include onset or worsening of or transition between psychosis and schizophrenia,[14,39–42] increased risk of car crashes,[14] increased risk of other mental illnesses, suicidal ideation and

attempts,[43,44] cardiovascular disease,[45] fertility problems in men and women[46,47] and, with smoking, respiratory disease.[14]

- Frequent cannabis use is also associated with poorer school performance,[48,49] higher unemployment,[49,50] and lower job income.[50,51]
- Cannabis use disorder is associated with higher rates of psychosis and schizophrenia,[52] mood disorders,[53,54] and cardiovascular disease.[55]
- The use of cannabis during pregnancy is associated with moderate increases in the risk of adverse neonatal health outcomes for the newborn including lower birthweight,[14] being small for gestational age, preterm birth, and neonatal intensive care unit admission.[56,57] It has also been associated with adverse maternal outcomes in California pregnancies including high blood pressure during pregnancy, preeclampsia, weight gain outside of the recommended ranges, and placental abruption.[58] Rates of daily use of cannabis during the year before pregnancy and during pregnancy have increased in recent years, are more common in pregnancies in younger individuals and those living in neighborhoods with greater deprivation and vary by race and ethnicity.[59] Most reports of use during pregnancy are in people who initiated use prior to pregnancy. Daily use during pregnancy in California increased faster than monthly or weekly use between 2009 to 2017.[59]
- Use during pregnancy may be associated with greater risk of long-term psychopathologies in children, including psychotic-like experiences and attentional problems, which have been documented over a decade after prenatal exposure, although findings are not consistent in all studies.[60–65]

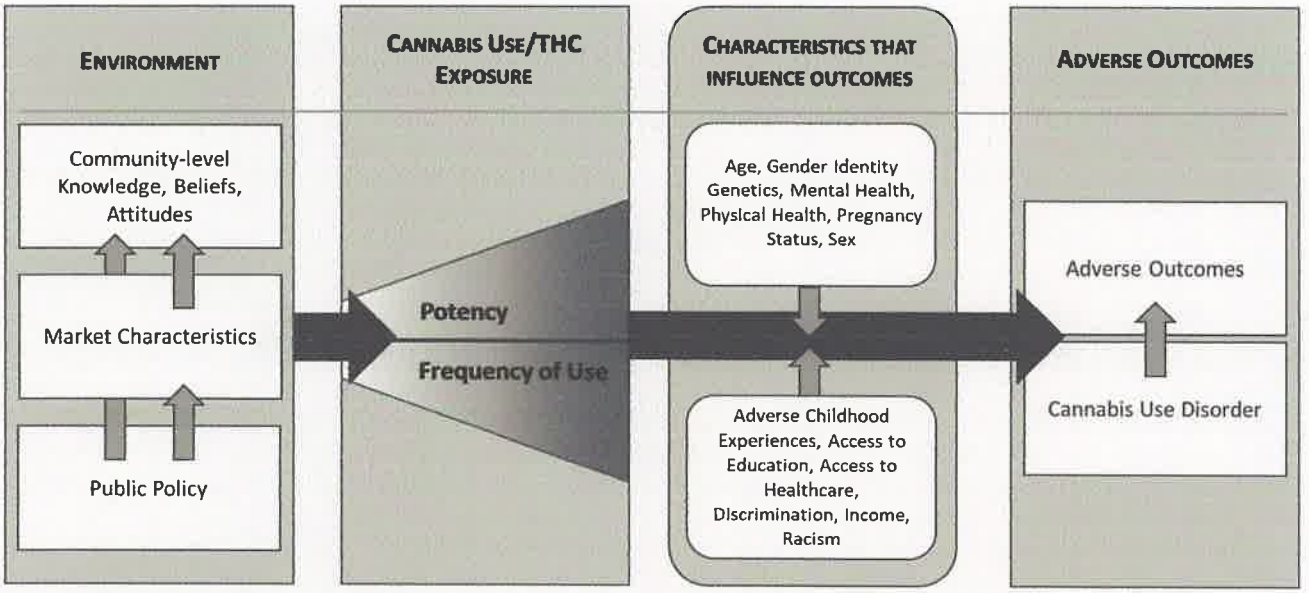
Specific Effects of High Potency Use

- Adverse effects are more likely to occur with the consumption of high potency products, especially when used frequently. High potency cannabis has been strongly associated with increased frequency of use, problematic use,[66] cannabis use disorder,[67] as well as with psychosis and schizophrenia.[68–70] The new 2024 NASEM report reinforces this conclusion.

> *"Indeed, high-concentration THC products are associated with a higher risk of psychosis and cannabis use disorder."*
>
> *National Academies of Science, Engineering and Medicine, 2024*

- The risk of progressing from cannabis initiation to cannabis use disorder increases with average potency available in the marketplace.[37]
- Long term-use of high potency products is associated with an increased severity of cannabis use disorder symptomology [71–74] and elevated risk of psychotic disorders.[41,75] Following a first-episode of psychosis, frequent use of high potency cannabis is associated with an increased risk of relapse, shorter latency to relapse, a greater number of relapses, and more intensive psychiatric care.[76] Exposure of populations to marketplace increases in THC concentrations are associated with a shorter latency to develop symptoms of problematic cannabis use[77] and increases in the treated incidence of both cannabis use disorders[78] and first-episode psychosis.[4,41]

Figure 3: *From Public Policy to Potency to Adverse Outcomes: A Conceptual Model*



THC content (potency) and frequency of use are crucial determinants of cannabis's impact on public health. Potency and frequency of use are influenced by **environmental factors**, such as the availability of high-potency products, marketing, and regulatory policies, and community knowledge and attitudes. **Individual characteristics** of people who use cannabis, including age and mental health status and **social determinants of health**, such as access to healthcare, adverse childhood experiences, and racism influence how potency and frequency of use affect adverse outcomes, and can also influence patterns of use. Cannabis use disorder, itself an adverse outcome, promotes a cycle of heavy use despite negative consequences, leading to further adverse outcomes.

Use of high potency cannabis increases risks both independently and in conjunction with factors such as frequency of use and individual vulnerabilities, including genetic predisposition to certain mental health conditions, as well as social determinants of health such as access to healthcare, adverse childhood experiences, and racism. By promoting more frequent and problem use, aggressive production and marketing of high potency products indirectly elevate the risk of other adverse effects by making it harder for individuals to moderate or cease use (Figure 3). Cannabis use disorder, itself an adverse outcome, promotes a cycle of heavy use, leading to further adverse outcomes.

Given the migration of the California market to high and very high potency cannabis, strategies to mitigate adverse health, educational, and social impacts must be holistic. These strategies should not only address the potency of the products themselves but also focus on increasing public awareness, promoting safer use, and reducing exposure to the highest-risk groups, such as adolescents and young adults, pregnant individuals, and those at risk of mental health conditions. A comprehensive strategy is essential to mitigate the risks associated with a high potency cannabis market.

DESIRED POLICY OUTCOMES

The group identified the following health outcomes as highest priority objectives for policies:

- ❑ Reduce the incidence of cannabis use disorder
- ❑ Reduce use and frequent use of cannabis by adolescents and youth under age 21
- ❑ Reduce cannabis-associated psychosis and psychotic disorders
- ❑ Reduce cannabis-associated emergency room visits
- ❑ Reduce cannabis use during pregnancy
- ❑ Reduce cannabis-impaired driving

Intermediate outcomes prioritized are:

- ❑ Increase public awareness of the hazards of high THC potency products and high THC intake
- ❑ Reduce sale and consumption of high THC potency products
- ❑ Increase availability of lower THC potency products

RECOMMENDED POLICIES TO REDUCE ADVERSE OUTCOMES FROM HIGH POTENCY CANNABIS

Given the factors that interact to create adverse outcomes from high potency cannabis, the Committee members have prioritized the following policies (Table 3) to reduce these adverse outcomes. The reader will note that there are different thresholds used as we suggest policy priorities. These thresholds, again, are not meant to imply that they constitute a "safe" cut-off below which there is no harm from excessive potency. Rather they are intended to reduce harms. There is a dose-response relationship between THC exposure and adverse health events, influenced by individual characteristics and history of use. As of our meeting, current science does not clearly identify specific thresholds (other than abstinence), below which there is no increased risk. Despite this limitation, we thought it was of great importance to propose thresholds with the potential to reduce harm based on observations of the California cannabis market vis-à-vis markets in other U.S. states, Canada, and Uruguay. These considerations seek to balance the benefits of a legal cannabis marketplace with preventing the harms to population health associated with unrestricted diversification of products driven by competition to sell a legal intoxicant. The recommendations considered most likely to have high impact are highlighted in green in Table 3 and presented in order in Table 4.

Table 3. *Recommended Public Policies for Reduction of Adverse Outcomes from High Potency Cannabis, by Category*

Recommended Policies to Reduce Adverse Health Outcomes Associated with High Potency Cannabis "Top ten" policies in terms of their likely impact are marked in green	
Marketing and Advertising	***Comments***
Prohibit cannabis and cannabis product advertising on billboards, and any other general public-facing advertising.	Billboard advertising directly reaches children, because a high percentage of the marketing is for high potency products, it markets these high potency products to children and youth. Billboard and other public-facing advertising that exposes children and youth to cannabis advertising is associated with youth cannabis use, including problem use. Research shows that frequent viewing of cannabis billboards by adolescents was associated with 6 times the odds of CUD. Rarely or sometimes viewing cannabis billboards by adolescents was associated with 5 times the odds of CUD compared to adolescents no billboard exposure.[79] Billboards and other public facing advertising should be fully prohibited. If allowed at all, it should be limited to where to obtain legal cannabis. 25 California jurisdictions prohibit cannabis billboards specifically or all billboards; 10 restrict cannabis billboards.
Restrict advertising of cannabis flower with over 20% THC or cannabis products with over 35% THC to simple plain text only.	Exposure to brand advertising of products and having a favorite brand is associated with a 3-fold increase in CUD and 8-fold increase in past year use among adolescents.[79] Liking or following a brand on social media is associated with a 5-fold increase in past year use by teens.[80] Advertising of these products can be made less appealing.
Product Requirements	***Comments***
Limit manufacture and sale of high THC products. Specifically: Prohibit the sale of liquid or solid concentrates for inhalation (e.g. dabs, wax, shatter) with THC content above 60% and implement careful oversight of allowable vehicles and diluents to ensure safety; Prohibit the sale of cannabis flower with THC content above 25% and prohibit the infusion of additional THC (or other psychoactive cannabinoids) into flower or pre-rolls; Limit edible products to a maximum of one 10 mg THC dose per physical piece or liquid beverage container (excluding tinctures).	***Concentrates:*** VT and CT have 60% limits on solid concentrates, budder, wax shatter, and resin. Quebec limits cannabis products to no more than 30% THC. Uruguay allows no edibles, vapes, oils, tinctures, or cannabis-infused products. In California currently there are products as high as 99% THC. ***Flower:*** VT and CT have 30% THC limits on flower. CA has no limit on flower, which can exceed 30% THC. Uruguay allows only plain flower sale, and limits flower to 15% THC. Germany prohibits flower above 10% for age 18-20. ***Edibles:*** CT, VT, and VA limit edibles to 5mg doses, and VT and VA limit packages to 50 mg. Canada limits edible packages to 10 mg. This would clarify for inexperienced edible consumers that taking more than 10 mg of an edible at once is not the norm. Currently there are 100 mg small beverage containers and bars.

Prohibit the use of added flavors (including fruits, mint, menthol, vanilla, chocolate, spices, and other common food flavors) in all inhaled products, whether natural or synthetic. Additionally, prohibit language and images that could lead consumers to believe the product has flavors other than those of cannabis. At a minimum, this should apply to flower or pre-rolls with THC content above 20% and other inhaled products with THC content above 35%.	For an extensive review of the science on how flavors attract youth and the role they have played in addicting youth see the FDA notice of proposed rulemaking for tobacco.[81] Watsonville and Contra Costa County prohibit flavored inhaled cannabis products. Canada has proposed regulations prohibiting flavored inhaled cannabis. CA prohibits flavored tobacco retail sales. Since nearly all manufactured inhaled products today are high potency, this will reduce their attractiveness to children and youth in particular. The Committee also recommends that strain names which include flavor references such as fruits may be provided on packaging in no larger than 6-point font (current font for health warnings) in an ingredients list located on side or back panels in black or white type. The current regulation on flavored additives in inhaled products should be strengthened and not weakened in any way (for example there should be no potency limit on current additive restrictions).
Retail Environment	***Comments***
Require retailers to offer lower dose options for flower (<10% THC) and edibles (5 mg or less), including products which are more suitable for medical use.	San Luis Obispo provides extra points to retailers who commit to stocking lower potency products. Canada's five-year evaluation report recommended "Distributors and retailers should stock cannabis products with diverse ranges of delta-9-tetrahydrocannabinol (THC) quantities or concentrations and take steps to encourage customers to choose lower-THC products whenever appropriate. "[13] The Swiss legalization pilot in Lausanne stocks 4 distinct potency ranges of flower coded with Greek letters for consumers.
Consider testing, promoting, or facilitating a Quebec-style public monopoly approach to cannabis sales, particularly in jurisdictions that have not yet legalized cannabis sales.	Use of a public monopoly approach has been recommended by experts as the policy most likely to be effective to reduce youth use of cannabis, excessive cannabis use among the general population, and cannabis-impaired driving.[82] Four Canadian provinces have variations of this policy, with Quebec being the strongest. Numerous US states still use state alcohol store approaches, which have been effective in reducing harmful alcohol use. Quebec has seen positive results, with successful legal market transition, high public satisfaction and profitable operations with lower increases in consumption than other provinces. This approach was highlighted in the 2024 NASEM report.
Require more robust age-gating for websites, online sales, and other online content, including independent third-party verification of identification before entry and sale.	Current requirements are weak and easily and widely circumvented.[83]

Taxation and Pricing	*Comments*
Restructure state excise taxation on adult-use cannabis to be proportional to the milligrams of THC in the taxed product, applicable to all cannabis products. Ensure that the restructuring maintains or increases cannabis tax revenue in line with the goals established by Assembly Bill 195 (the 2022-2023 legislative commitment to replace revenue lost from the cultivation tax cut by 2026).	This recommendation is consistent with that of the California Legislative Analyst's office. Used successfully by CT, IL, and Canada. CT requires retailers to pay a potency excise tax. The tax rates are $0.00625 per mg of total THC in flower; $0.0275 per mg of total THC in edibles; and $0.009 per mg of total THC in other cannabis products. IL has a cannabis potency tax of 10% of the purchase price for cannabis with Delta-9 THC levels at or below 35% and 25% of the purchase price for cannabis with Delta-9 THC levels above 35%. NY tax (repealed): Cannabis flower at 0.5 cents per mg of total THC; concentrated cannabis at 0.8 cents per mg of total THC; and cannabis edible products at 3 cents per mg of total THC. The California Legislative Analyst's Office recommended: *Currently available information suggests that a potency-based tax in the range of $0.006 to $0.009 per milligram of THC could be appropriate.*[16] The City of Grass Valley taxes potency as *"an additional tax of up to 1% of the gross receipts from high potency cannabis and each high potency cannabis product cultivated, manufactured or sold by the taxpayer, multiplied by the percent of the THC content above 17%; and an additional tax of 20% of gross receipts from sweetened cannabis beverages." Cathedral City also has a tax that varies by product type.* Canada's five-year review of cannabis legalization recommended maintaining and strengthening its THC based tax.[13]
Prohibit discounting or promotion of flower >20% THC or other inhaled products over>35% THC.	Restrictions on discounting and promotions have been widely and successfully used in tobacco control as these discounts increase youth purchasing.[84,85] They are part of the global Framework Convention on Tobacco Control. Pasadena and three other CA cities use them for cannabis. This would focus a statewide restriction on higher potency products.
Attractiveness to Children, Packaging, Labeling, and Consumer Information	***Comments***
Enforce existing laws and regulations that prohibit products that are attractive to children and restrict flavored additives in inhaled cannabis products.	This will greatly assist in reducing use by the group most vulnerable to high potency products: children and youth. CA issued a limited prohibition addressing flavored additives in inhaled cannabis in 2022, yet these products remain widely available.
Require plain packaging for all cannabis products with flower THC content above 20%, inhaled products exceeding 35% THC, and edibles containing more than 10 mg of THC per individual piece or liquid container, if permitted. Ideally, this should extend to all cannabis products.	This practice is in use in several states, including CT, MO, MA and NJ.[86] MO is requiring pre-approval of packaging/labeling. This practice has also been in use in Canada since legalization. A recent 5-year review of Canada's legalization recommended maintaining plain packaging.[13]

	A recent study supported the effectiveness of this approach for cannabis.[87]
Require clear standard information on the number of standard doses in a package on all cannabis and cannabis product packaging, based on a standard dose of 5 mg THC.	NIH has recommended use of the 5 mg standard dose and Canada is examining it.[11–13]
Strengthen regulations with clearer, evidence-based criteria for identifying and prohibiting products, packaging, marketing, and advertising characteristics that appeal to children and youth.	These include, for example, use of illustration including cartoons, animals/creatures, food and flavors terms and images, discounts or bonuses, distinctive colors and shapes (especially red, orange, yellow, or green in edibles), positive sensations, psychoactive appeals, action/adventure, brand sponsorships of sports and entertainment events or other social or cultural events.[88–92] While CA State law and regulation establish some criteria, they are insufficient and less stringent than several other states.
Require prominent, rotating, graphic front-of-package health warning labels on cannabis products and on advertising, including specific warnings about high potency THC, such as risks of dependency and mental health harms. Health warnings should cover at least one-third of the front-of-package and 15% of any print advertisement surface, with clear contrast between the warnings and the background. *Examples: "WARNING: Cannabis use may contribute to mental health problems, including serious mental health conditions. Risk is greatest for people who use frequently and when using products with high THC levels; "WARNING: The higher the THC content, the more likely you are to experience adverse effects and impairment. THC may cause severe anxiety and disrupt memory and concentration; "WARNING: Prolonged use of cannabis products high in THC may cause recurrent, severe nausea and vomiting."*	FDA is moving to require graphic front of pack warnings on tobacco based on extensive research. Many countries have adopted this approach for tobacco products. Canada requires strong front-of-package rotating warnings with a contrasting yellow background on all cannabis. They are in the process of updating their warnings including those related to psychosis and mental health. Research testing potential cannabis labeling options have found prominent graphic rotating warnings to be effective and the psychosis warning to be particularly valuable for youth.[93–97]
Adopt this Committee's recommendations for implementing SB540 requirements	See section on SB540.
Public Education	***Comments***
Fund and implement public education campaigns on the risks of high potency cannabis, including mental health risks. Allocate additional funds from Tier 3 of cannabis tax revenue (without reducing the Elevate Youth program) to the CDPH, totaling $10 million or more per year beyond their current allocation. These funds should be used to enhance high-quality cannabis prevention education campaigns, including those focused on high potency messaging, as well as supportive	Public education campaigns are a best practice for tobacco control which are readily adaptable to cannabis. Effective public education campaigns are those that reach at least 75% of the intended audience in each quarter of the year,[98] are well-liked within the intended audience and do not perpetuate stigma,[99,100] feature messages that are statistically associated with beliefs and behaviors the campaign seeks to change,[101] and seek to influence beliefs and behaviors that have "room to move."

formative research and testing of messaging. Prioritize campaigns addressing use during pregnancy, drugged driving, and education for youth and seniors.	
Compliance Screening, Data Collection, Research, and Evaluation	***Comments***
The Department of Cannabis Control and the state budget should allocate funds from the regulatory tier of taxation to establish a pre-market product and packaging review team. This team would screen new products for compliance with these recommendations (if accepted), existing regulations, and attractiveness to children. The team should also review all existing products within two years. Priority should be given to inhaled products with over 50% THC, followed by cannabis flower with over 20% THC, and edibles with more than one dose in a single container or physical piece.	This approach can preventively reduce noncompliant products marketed and improve the safety of the legal market. MA and Canada use this approach. MD reviewed medical products for compliance. MO is adopting pre-market review of packaging.
Fund and ensure the tracking and regular reporting of negative health outcomes associated with high potency products in California hospitals, hospital emergency departments, and ambulatory care settings. Surveillance systems should include the type and potency of marketed products as required data elements. Additionally, incentivize increased screening to more clearly document the product type used in clinical services and poison control cases.	Current budgetary allocations support CDPH epidemiologic surveillance of legalization impacts. This important effort needs to be adequately funded and deepened to carefully examine mental health and other impacts, and also not to compete with CDPH spending on public education, which needs its own strong allocation.
The Administration and the DCC should support making the current Prop 64 requirement of at least $10 million in annual cannabis tax revenue for research an ongoing budgetary commitment. This funding should maintain a focus on research on health outcomes and policies related to cannabis potency. The requirement, currently set from 2018 to 2028, should be extended beyond 2028 and adjusted for inflation.	While this recommendation was rated as highly impactful, the authors excluded it from Table 4 due to the potential perception of a conflict of interest of Committee members.
Provide additional funding in the 2024 budget to the University of California Office of the President to support scientific advice and testing related to the implementation of SB540. This funding should include support for developing additional warning messages, such as those regarding high potency, and for creating and evaluating SB540 retailer flyer language. Additionally, allocate funding for similar support every five years for re-evaluating messaging and message design, adjusted for inflation.	Best practices for the design of warning labels and public education materials and campaigns include testing materials with consumers for effectiveness. Canada carried out focus group research for its health warning labels and is doing so again this year.

Table 4. *Top Ten Recommended Policies by Likely Greatest Impact on Adverse Outcomes, in Order*

Top Ten Recommended Policies by Likely Greatest Impact on Adverse Outcomes, in Order
Prohibit cannabis product advertising on billboards, or any other general public-facing advertising
Limit manufacture and sale of high THC products. Specifically a) prohibit the sale of liquid and solid concentrates for inhalation (e.g. dabs, wax, shatter) with THC content above 60% and implement careful oversight of allowable vehicles and diluents to ensure safety; b) Prohibit the sale of cannabis flower with THC content above 25% and prohibit the infusion of additional THC (or other psychoactive cannabinoids) into flower or pre-rolls; and c) Limit edible products to a maximum of one 10 mg THC dose per physical piece or liquid beverage container (excluding tinctures).
Consider testing, promoting, or facilitating a Quebec-style public monopoly approach to cannabis sales, particularly in jurisdictions that have not yet legalized cannabis sales.
Restructure state excise taxation on adult-use cannabis to be proportional to the milligrams of THC in the taxed product, applicable to all cannabis products. Ensure that the restructuring maintains or increases cannabis tax revenue in line with the goals established by Assembly Bill 195 (the 2022-2023 legislative commitment to replace revenue lost from the cultivation tax cut by 2026).
Enforce existing laws and regulations that prohibit products that are attractive to children and restrict flavored additives in inhaled cannabis products.
Prohibit the use of added flavors (including fruits, mint, menthol, vanilla, chocolate, spices, and other common food flavors) in inhaled products, whether natural or synthetic. Additionally, prohibit language and images that could lead consumers to believe the product has flavors other than those of cannabis.
Strengthen regulations with clearer, evidence-based criteria for identifying and prohibiting packaging, marketing, and advertising characteristics that appeal to children and youth.
Fund and implement public education campaigns on the risks of high potency cannabis, including mental health risks. Allocate additional funds from Tier 3 of cannabis tax revenue (without reducing the Elevate Youth program) to the CDPH, totaling $10 million or more per year beyond their current allocation. These funds should be used to enhance high-quality cannabis prevention education campaigns, including those focused on high potency messaging, as well as supportive formative research and testing of messaging. Prioritize campaigns addressing use during pregnancy, drugged driving, and education for youth and seniors.
Fund and ensure the tracking and regular reporting of negative health outcomes associated with high potency products in California hospitals, emergency rooms, and ambulatory care settings. This should include documenting the type and potency of marketed products. Additionally, incentivize increased screening to more clearly document the product type used in clinical services and poison control cases.
Require plain packaging for all cannabis products. At a minimum, this should apply to high potency products, including flower with THC content above 20%, inhaled products exceeding 35% THC, and edibles containing more than 10 mg of THC per individual piece or liquid container, if permitted.

INPUT ON INFORMATION TO CONSUMERS FOR SB540 IMPLEMENTATION

In 2023 the California state legislature passed SB 540 (Senator Laird) after a previous similar effort through SB 1097 (Senator Pan) in 2022. The bill added language to the Medicinal and Adult-Use Cannabis Regulation and Safety Act (MAUCRSA). It created critically important and legislatively mandated opportunities to address risks from high potency cannabis through two consumer information strategies – a required brochure at point of sale and mandated reassessment of health warnings on packaging every 5 years.

The bill, by January 1, 2025, requires the DCC, in consultation with the State Department of Public Health, to create and post for public use a single-page flat or folded brochure that includes steps for safer use of cannabis, including, but not limited to, both of the following:

A) Information about the pharmacological effects of cannabis use.

B) Information on the implications and risks associated with, but not limited to, all of the following:

   i) High potency cannabis products.
   ii) The potential for THC to exacerbate certain mental health conditions.
   iii) Cannabis use by minors.
   iv) Cannabis use by pregnant and breastfeeding persons.

The bill, by March 1, 2025, requires a retailer or microbusiness selling, or person delivering, cannabis or cannabis products to a consumer to:

- ❑ Prominently display the brochure, including printed copies, at the point of sale or final delivery in person or online
- ❑ Offer each new customer a copy of the brochure at the time of first purchase or delivery.

The bill, by January 1, 2030, and every 5 years thereafter, requires the department to either recertify the information in the brochure or provide updated language, as specified.

The California Department of Public Health requested support from the Committee to propose language to inform consumers in compliance with this legislative mandate for point-of-sale information, particularly in regard to high potency. The group developed the following model trifold brochure as our recommendation to the State agencies. It is based on the current state of the science on cannabis risks and publications such as the lower risk cannabis use guidelines,[102] as well as on expertise in developing effective public education campaigns on health issues and health literacy.

***Figure 4**: Committee Recommendations for the SB540 Point-of-Sale Brochure*

Tips for a safer (and better!) cannabis experience.

1. Cannabis can wait.

If you want to use cannabis, wait at least until you turn 21. It will reduce the chance of long-term health harms including addiction.

Your brain doesn't stop maturing until your late twenties. So, the younger you start using cannabis, the higher the risk of long-term harms. Frequent use, especially of high THC products, affects not only the brain but also other organs in the body. This increases the risk of becoming dependent on cannabis and of mental health and reproductive problems. Frequent use when you are young can worsen your school performance and lower your future income.

2. Use less often.

The more you use cannabis, the worse its unwanted effects.

People who use cannabis daily or almost daily are much more likely to develop long-term health problems. These include changes in brain function, reduced fertility for men and women, mental health problems, impaired driving, and doing poorly in school. For a safer and better cannabis experience, limit your use to one day a week or on weekends, or less.

3. Start low and go slow.

Higher THC does not mean a better cannabis experience, especially if you are new to it.

The effects of using high THC products are harder to control. High THC products increase the chance of unpleasant effects like paranoia, panic, and severe vomiting. Frequent use of these products can cause dependence and increase the risk of psychosis in some people.

- Always check labels for THC content and choose lower-THC products.
- If you use flower or edibles, consider using flower with 10% THC or less or edibles with 5 mg or less. Ask your retailer to carry lower-THC products.
- If you smoke or vape, wait between puffs until you feel the full effect, to avoid taking too much. If you vape, be aware you are using a high THC product.
- Avoid concentrates, especially if you are new to cannabis.

4. Pregnancy and nursing are not the right time for cannabis use.

Doctors do not recommend cannabis use during pregnancy or during the months while you are nursing.

THC and other chemicals in cannabis are passed from mother to child and may harm your baby's health. Cannabis can increase the risk of delivering too early, low birth weight, the baby needing intensive care, and of developmental problems. Try to stop before pregnancy, but cutting back at any time can still help protect your baby. If you have nausea during pregnancy, ask your healthcare provider about recommended treatments.

5. Consider your history.

Do you or a family member have serious mental health challenges or addiction? Cannabis can make things worse.

If you, or people in your family have had any serious mental illness (like psychosis, schizophrenia or mood disorders) or challenges with substance use, this increases your risk for harm. You should avoid cannabis. Even though you might feel better at first, continued use may worsen your mental health.

6. Edibles take time to act.

Edibles can typically take 30 minutes to 1 hour to act, but full effects can take as long as 2 to 4 hours. Consuming more during this time may cause unpleasant adverse effects.

7. Store safely.

Keep your cannabis locked up if you have children, pets, or visitors in your home. Hiding it may not be enough to keep children safe — especially with edibles.

8. Do not drive.

Driving after using cannabis increases your risk of accidents.

Do not drive or operate heavy machinery. Even after effects seem to have worn off, your driving can still be impaired for more than 4 hours. Using cannabis with alcohol or certain other drugs further increases crash risk.

TIPS FOR A SAFER (AND BETTER) CANNABIS EXPERIENCE

For more information:

hello@yourdomain.com

www.yourwebsite.com

SCAN ME

YOUR LOGO

Place Holder: Other content

Poison Control Helpline
(800) 222-1222

Suicide & Crisis Lifeline
Dial 9-8-8

Current state law also requires cannabis and cannabis product labels and inserts to include specified warnings about the safety of cannabis use that were defined in the 2016 ballot initiative. This is currently a long sentence typically printed in 6-point font (cannot be smaller), without requirements for contrast or illustrations, on the back or sides of products, or in some cases on inserts or peel off labels, in even less prominent locations.

SB540 requires DCC, on or before July 1, 2025, to reevaluate regulations for the above-described warnings to determine whether any additional warnings are necessary to reflect evolving science and would require the department to adopt regulations for cannabis and cannabis product labels or inserts reflecting the evolving science regarding the risks that cannabis use may pose for consumers.

The bill also requires that by January 1, 2030, and every 5 years thereafter, DCC to reevaluate the adopted regulations to determine whether the requirements reflect the state of the evolving science on cannabis health effects and on effective communication of health warnings.

The Committee worked to include recommendations regarding health warnings and the research needed to inform their reassessment to assist in compliance with this important new legal mandate. (Table 2) Recommendations also include funding recommendations for evaluation of the brochure and for formulating best health warnings, which was also recommended in the legislation. Budgeting for cannabis policy research is already part of required state spending of cannabis tax revenues, at least through 2028 and the group recommends maintaining that allocation indefinitely. Updating of warning labels every 5 years to reflect current science is one important reason to fund ongoing cannabis policy research.

SUPPORT FOR RESEARCH AND EVALUATION

These policy recommendations were made with the best available scientific evidence. However, as is often the case in the development of public health policy, much remains to be learned about the health and social impact of using high potency cannabis, and about the effectiveness of the proposed policies to address it. **Ongoing research is important to further clarify associations of potency with problem use, mental health effects and other adverse or positive outcomes.** Our review demonstrates that further research, especially using more standard exposure measures and longitudinal designs to further test and strengthen the evidence of associations is urgently needed.

Therefore, the Committee recommends funding be allocated for research and evaluation in this topic area. Specifically, research is needed to better understand what populations are susceptible to adverse mental health effects of high potency cannabis; what messages will be most effective in preventing or reducing use of high potency cannabis among susceptible populations, including youth, people who are pregnant or breastfeeding, and people with preexisting mental health conditions; whether taxes and other incentives can reduce the mean level of THC available for sale in California; whether product limits reduce adverse outcomes, whether packaging and labeling requirements can result in more THC-informed consumers. The Committee recommends that CDPH evaluate the effectiveness of any high potency THC policies implemented as a result of this process, to document outcomes as a model for other states and the federal government, and so adjustments can be made to local, state and Federal policies if necessary to increase effectiveness.

CONCLUSION

The consensus of this Committee is that the potency (i.e., the concentration of delta-9 THC) contained in the cannabis plant, as well as products derived from it, is substantially higher today than it has been historically and far exceeds levels typically studied in carefully designed scientific trials. In California today, which has had a medical market since 1996, the average potency of herbal cannabis sold is significantly higher than that sold in most state markets as well as those of other countries. California's marketplace also offers a variety of cannabis products which deliver doses of THC that far exceed that which can be obtained through vaping or smoking the plant itself.

In December 2023, this Committee developed a plan to synthesize research on high potency cannabis and recommend policies to mitigate the health harms associated with its use, particularly among youth, pregnant or breastfeeding individuals, and those vulnerable to psychosis or other mental health conditions.

"Given the expansive migration of the California market to high and very high potency cannabis, the Committee concluded that strategies to mitigate adverse health, educational, and social impacts are urgently needed and must be holistic. These strategies should not only address the potency of the products themselves but also focus on increasing public awareness, promoting safer use, and reducing exposure to the highest-risk groups."

The Committee concluded that health risks, regardless of population being studied, are likely to rise in a dose-response fashion with use of higher potency cannabis. We also recognize that age, experience with the product, pregnancy, risk of mental illness, and other individual and social factors influence the likelihood of adverse outcomes. While we did not conclude that a specific threshold defines high potency cannabis, below which use is "safe," we did identify potential policies that can reduce harm from higher potency products. Developing guidelines to help moderate those risks, in light of the availability of the wide array of cannabis products containing historically large amounts of THC in the California marketplace, is prudent given the existing scientific evidence of adverse health effects associated with frequent and prolonged use of cannabis generally. High potency cannabis increases risks both independently and by increasing frequent use and cannabis use disorder. Increases in risk from high potency cannabis are influenced by factors such as frequency of use and individual vulnerabilities, including genetic predisposition to certain serious mental illnesses.

Given the expansive migration of the California market to high and very high potency cannabis, the Committee concluded that strategies to mitigate adverse health, educational, and social impacts are urgently needed and must be holistic. These strategies should not only address the potency of the products themselves but also focus on increasing public awareness, promoting safer use, and reducing exposure within the highest-risk groups. As the Committee closed its work, we were pleased to see that this approach is consistent with that advised in the newly issued 2024 NASEM report, which calls for definition of best practices that encompass marketing restrictions (e.g., on advertising and packing), age restrictions, physical retail and retail operating restrictions, taxation, price restrictions, product design, and measures to limit youth access.

Noting this need for a holistic approach to mitigate risk, and the widely held belief from this Committee of experts and others that there is likely to be a dose-response relationship between exposure to THC and adverse health events, mediated by individual characteristics and history of use, the members of this group first generated a broad list of policy recommendations aimed at trying to minimize the marketing and packaging appeal of higher potency cannabis products especially among youth, reduce the amount of THC currently contained with these products, limit the availability of particularly high potency products, increase the relative price of these goods through potency-based taxation, and increase consumer awareness of the risks associated with their use. Through a modified Delphi-process we then ranked which of these were likely to have the highest impact on adverse health consequences, drawing on our knowledge of the current state of the cannabis science as well as our understanding of the effectiveness of similar strategies at reducing heavy drinking and cigarette smoking. The highest ranking strategies included prohibitions on billboards and other public facing advertisement; limits on the manufacture and sale of high THC products similar to those adopted in Connecticut and Vermont, the adoption of a public monopoly model (which may still be useful in the large parts of the state which have not yet licensed retailers); taxing cannabis based on THC content rather than weight; enforcing existing laws and regulations that prohibit the development of products that appeal to children and youth, especially those including flavored additives; strengthening the prohibition on added flavor or flavor marketing in inhaled products; strengthening regulations on packaging and advertisement that appeals to youth; funding a comprehensive public health campaign focused on the risks of high potency cannabis specifically; conducting surveillance of health outcomes tied to the potency of cannabis products; and requiring plain packaging of cannabis products with historically high levels of THC.

In response to a request by the California Department of Public Health, as part of their collaboration with the Department of Cannabis Control in implementing new legislatively required public awareness messaging on high potency cannabis (SB540), we also generated a Point-of-Sale Brochure highlighting various tips to help educate the public about cannabis use, higher potency, and simple steps to have a safer (and more enjoyable) experience with cannabis if they opt to use it.

We appreciate the opportunity to share these thoughts and recommendations with the California Department of Public Health and its colleagues across state government, as we understand the difficulty of identifying evidence-based policies in the setting of a rapidly changing market where today's products are substantially changed from those studied in past research.

Choosing not to act on high potency cannabis is as much a policy choice as implementing new policies, and one with significant negative implications for mental health, substance abuse, and other areas. It is time to change course and acknowledge that not all that can be derived from cannabis should be treated as safe consumer products. As a state, we have an interest in building a safer legal cannabis market for the long-term; one in which educated consumers can have greater confidence, and which provides legal access to products, packaging, and marketing less likely to induce harmful patterns of use, cannabis use disorder, or other harms.

We extend these recommendations to our Governor and to the relevant policymaking and public health bodies of our state, including the State Legislature, the Department of Cannabis Control, The California Department of Public Health, the broader Department of Health and Human Services, the Department of Tax and Finance Administration, the State Auditor and the Department of Justice. We urge the State of California, with all its components, to work together to pass and implement these policies.

APPENDIX: COMMITTEE MEMBERS

Jane Appleyard Allen, MA (Co-Chair), Jane Appleyard Allen is a Senior Scientist in the Center for Communication and Media Impact at RTI International. She has 25 years of experience evaluating state and national public education campaigns, conducting formative research for campaign message development, and conducting research to understand consumer perceptions of cannabis and tobacco products and policies. Ms. Allen's media campaign experience includes Colorado's Retail Marijuana Education Program, FDA's The Real Cost campaign, the national truth campaign, and the National Youth Anti-drug Media Campaign. In collaboration with RTI's Racial Justice and Equity Program and RTI's Black Employee Resource Group, Ms. Allen facilitates trainings that prepare participants to understand and work effectively to dismantle anti-Black systemic racism.

Neal Benowitz, MD, Professor Emeritus of Medicine University of California San Francisco School of Medicine, Cardiologist, Clinical Pharmacologist, Medical Toxicologist, Expert in pharmacology and toxicology of nicotine and of cannabis, Past President of the American Society for Clinical Pharmacology and Therapeutics.

Ricky Bluthenthal, PhD, Distinguished Professor of Population and Public Health Science, Associate Dean for Social Justice, Interim Chair, Department of Population and Public Health Science, University of Southern California Keck School of Medicine, Sociologist, substance abuse and HIV researcher.

Beatriz H. Carlini, PhD, MPH. Research Associate Professor, Addictions, Drug & Alcohol Institute, Department of Psychiatry & Behavioral Sciences, University of Washington School of Medicine. Director, Cannabis Education & Research Program (CERP). Social psychologist who has studied public health impact of legal psychoactive substance use and policies on social and health outcomes. In 2020, she chaired the WA Prevention Research Subcommittee Cannabis Concentration Workgroup, which authored a Consensus Statement and Report on Cannabis Concentration and Health Risks. In 2021-22, Dr. Carlini and team led development of policy recommendations for the WA State Health Care Authority related to cannabis concentration and mitigating detrimental health impacts, resulting in a report to WA Legislature in 2022.

Ziva Cooper, PhD, Director of the University of California Los Angeles Center for Cannabis and Cannabinoids in the Jane and Terry Semel Institute for Neuroscience and Human Behavior and Professor in the UCLA Departments of Psychiatry and Biobehavioral Sciences and Anesthesiology. Dr. Cooper served as a member of the National Academies of Science Engineering and Medicine 2017 review of the Health Effects of Cannabis and Cannabinoids, and on their 2024 committee on the Public Health Consequences of Changes in the Cannabis Policy Landscape, as President of the International Cannabinoid Research Society, a past Board Director for the College on Problems of Drug Dependence, an Associate Editor of Neuropsychopharmacology, and as an editorial board member for several journals including American Journal of Drug and Alcohol Dependence and Cannabis and Cannabinoid Research.

Timothy Fong, MD, Professor of Psychiatry, board certified in Addiction Psychiatry, at the Semel Institute for Neuroscience and Human Behavior at the University of California Los Angeles and the UCLA Brain Institute. He directs the UCLA Addiction Psychiatry Fellowship and is part of the faculty leadership of the UCLA Center for Cannabis and Cannabinoids.

Bonne Halpern-Felsher, PhD is Marron and Mary Elizabeth Kendrick Professor in Pediatrics, Taube Endowed Research Faculty Scholar and Professor (by courtesy), Epidemiology & Population Health; Psychiatry & Behavioral Sciences at the Stanford University School of Medicine. She is founder and Director of the REACH Lab in the Division of Adolescent Medicine, Department of Pediatrics, Stanford University. Dr. Halpern-Felsher is a developmental psychologist with extensive experience in tobacco research and regulation, and more recently, cannabis. She recently joined the California Department of Cannabis Control's Cannabis Advisory Committee.

Renee M. Johnson, PhD, MPH is Professor & Vice Chair for DEI in the Department of Mental Health at the Johns Hopkins Bloomberg School of Public Health. Her research addresses substance use, overdose prevention, injury and violence, adolescent/emerging adult health, and health equity. uses social epidemiology and behavioral science methods to investigate injury/violence, substance use, and overdose prevention. Dr. Johnson co-leads the Drug Dependence Epidemiology Training Program.

Pamela Ling, MD, MPH, Professor of Medicine at the University of California San Francisco School of Medicine. Dr. Ling directs the UCSF Center for Tobacco Control Research and Education and has extensive experience in a broad range of tobacco and cannabis research, including product marketing and promotion, industry strategies, consumer perceptions, young adult tobacco and cannabis use and co-use behavior, and prevention, cessation and policy interventions.

Rosalie Liccardo Pacula, PhD, Professor and Elizabeth Garrett Endowed Chair in Health Policy, Economics and Law, and Chair of the Health Policy and Management Department within the Price School of Public Policy at the University of Southern California. Dr. Pacula is an economist and expert in the economics of addiction and related policy. She served on NIDA's National Advisory Council Cannabis Policy, the Substance Abuse and Mental Health Services Administration (SAMHSA's) technical advisory committee on preventing cannabis use among youth, the World Health Organization's Technical Expert Committee on Cannabis Use and Cannabis Policy, and as Past President of the International Society for the Study of Drug Policy. She currently serves as Co-Chair of the National Academies of Sciences, Engineering and Medicine's (NASEM's) Forum on Mental Health and Substance Use Disorders and was part of the 2024 NASEM Committee on the Public Health Consequences of Changes in the Cannabis Policy Landscape.

Daniele Piomelli, PhD, is Distinguished Professor, Anatomy & Neurobiology at the University of California Irvine School of Medicine, Louise Turner Arnold Chair in Neurosciences, holds a Joint Appointment in Biological Chemistry. Dr. Piomelli is the Director of the Center for the Study of Cannabis and Editor-in-Chief of Cannabis and Cannabinoid Research. He is a pharmacologist and neuroscientist with extensive research in schizophrenia and depression as well as cannabinoid basic science. He was a member of the National Academies of Science Engineering and Medicine 2017 review of the Health Effects of Cannabis and Cannabinoids.

Lynn D. Silver, MD, MPH (Co-Chair), Senior Advisor at the Public Health Institute, Director of the Prevention Policy Group and of Getting it Right from the Start at PHI, a national cannabis policy initiative which developed the first public health-oriented model laws for cannabis retailing, marketing and taxation. She is Clinical Professor of Epidemiology and Biostatistics and the University of California San Francisco School of Medicine and served on the Proposition 64 Stakeholder Advisory Committee for the State of California Department of Health Care Services. Dr. Silver is board certified in pediatrics and has extensive experience as a public health official. Her current research is primarily in the areas of cannabis policy and health effects,

food taxation and other public health regulatory and funding policies. She has served as consultant to the World Health Organization, the World Bank, and the Campaign for Tobacco Free Kids on policies for prevention of noncommunicable disease.

Kelly C. Young-Wolff, PhD, is a clinical psychologist and research scientist at the Kaiser Permanente Northern California Division of Research, Adjunct Associate Professor in the Department of Psychiatry, University of California, San Francisco; Adjunct Lecturer in Medicine at the Stanford University School of Medicine; and Professor, Kaiser Permanente Bernard J. Tyson School of Medicine. Dr. Young-Wolff's research focuses on substance use, among vulnerable populations, including pregnant persons and adolescents, and evaluates the impact of changes in local, state, and national drug policies. She serves on the 2024 National Academies of Sciences, Engineering, and Medicine's committee on the Public Health Consequences of Changes in the Cannabis Policy Landscape. Dr. Young-Wolff's also conducts research on intimate partner violence and adverse childhood experiences (ACEs) and serves on the California Surgeon General's ACEs Aware Evaluation and Evidence Advisory Committee.

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