

MMCPS-23, SEPTEMBER 2023



Maryland Medical Cannabis Patient Survey Report 2023

*SECOND WAVE SURVEY
COMPARING PATIENT ATTITUDES
AND BEHAVIORS PRE- AND POST-
ADULT-USE CANNABIS
LEGALIZATION IN MARYLAND*

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Maryland Cannabis
Administration

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The Maryland Cannabis Administration (MCA), formerly the Maryland Medical Cannabis Commission (MMCC), sponsored this “post-legalization” survey and report from Cannabis Public Policy Consulting (CPPC) to examine similarities and differences in patient perceptions and behavior prior to and following legalization of cannabis in Maryland for adults 21+. The MMCPS-23 follows the first wave MMCPS-22, a “pre-legalization” survey that was conducted in September 2022, prior to the ballot referendum in which voters approved legalization of the sale of cannabis to adults 21 and over beginning July 1, 2023. As with the MMCPS-22, more than 15,000 patients took part in the MMCPS- 23 survey, conducted in September 2023, approximately three months after the start of adult-use sales in the State. This report details the extent to which key measures of interest changed with expanded legalization, including patterns of use, perceptions of risk and benefit, and the occurrence of high-risk behaviors related to cannabis use.

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NOTHING IN THIS REPORT IS INTENDED AS MEDICAL ADVICE

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Executive Summary

The Maryland Medical Cannabis Patient Surveys (MMCPS) consisted of two cross-sectional surveys strategically conducted to capture patterns of use and perceptions of the state's medical cannabis patient population before and after the pivotal transition to adult-use legalization. The approach was designed to provide a comprehensive understanding of medical cannabis patients' demographic characteristics, patterns of use, risk perceptions, and outcomes related to cannabis use, in the context of both medical-only use and the newly introduced adult-use marketplace. Findings of the MMCPS will inform programmatic and policy efforts and offer critical insights to stakeholder groups, patients, healthcare providers, public health and safety professionals, and dispensary employees.

This report details methods and results from the post-legalization 2023 Maryland Medical Cannabis Patient Survey (MMCPS-23) study. The two-timepoint design (i.e., pre- and post-legalization) allowed the Maryland Cannabis Administration (MCA) and the researchers to corroborate initial findings from the pre-legalization survey and explore emerging topics and questions. While causal relationships cannot be defined from cross-sectional surveys, data from the first and second wave are presented together in this report where appropriate. The two-timepoint observations provide novel policy and programmatic insights.

MEDICAL CANNABIS IN MARYLAND

Medical cannabis has been legal in Maryland since 2013 and available for purchase at licensed dispensaries since 2017. Patients with certain qualifying conditions, such as cachexia, chronic pain, or post-traumatic stress disorder (PTSD), can obtain a written certification from a certifying healthcare provider to legally purchase and consume medical cannabis. As part of medical certifications, patients and caregivers are also required to register with MCA. Certified patients (hereafter, “patients”) can legally purchase a variety of cannabis products, including flower, edibles, oils, concentrates, and tinctures. While certifying providers determine how much medical cannabis a patient may purchase in a 30-day period, the standard monthly allotment is 120 grams of flower or 36 grams of THC product.

When legal adult-use cannabis sales began in Maryland in July 2023, new protections and accommodations for the medical program were adopted to ensure adequate access for patients. Dispensaries are required to keep an adequate supply for patients and to have patient-only store hours or dedicated purchase lines for patients. In addition, high-potency THC products (>10 mg THC per service or >100 mg THC per package) are offered for sale only for patients, and medical cannabis is not subject to the 9% adult-use sales tax.

CRITICAL TAKEAWAYS

1. The current study is the largest to our knowledge to compare repeated, cross-sectional datasets of medical cannabis patterns of use and outcomes across years.

- In total, over 30,000 patients participated and over 400 variables were measured in the 2022 and 2023 surveys. The robust sample size allows for measuring of associations between variables and subgroup analyses with confidence.
- A novel approach for measuring cannabis dose in a self-report survey was developed and demonstrated initial validation across survey years. Dose is an emerging area of research as well as a potential mechanism for patients and adult-use consumers to better monitor their consumption.

2. Many positive outcomes were observed that affirm the Maryland Medical Cannabis Program's commitment and service to the patient population.

- The robust response rate demonstrates that patients are passionate about and actively engaged with the medical program.
- In 2022, about 9% thought they would leave the medical program in favor of the adult-use program, but less than 2% of respondents in the 2023 sample communicated their intent to discontinue their participation in the medical program when their certification expires.
- Respondents reported high satisfaction across several survey measures, including the safety of medical cannabis products, product availability, and price.

3. Patterns of use were consistent or showed only small changes from 2022 to 2023 (i.e., pre/post adult-use legalization).

- Average days of use per month increased slightly from 21.3 to 22.1 days.
- Flower, edibles, vape, and concentrates remained the four most common methods of administration.
- Median dose per occasion was unchanged at 27 mg/THC.
- Qualifying conditions were consistent between 2022 and 2023, with 92% reporting chronic pain, "other chronic condition," or PTSD as their qualifying conditions.

4. Measures of public health harms showed worrisome increases from 2022 to 2023.

- The percentage of respondents who drove under the influence of cannabis one or more times in the past month doubled (from 18% to 39% respectively).
- Among currently pregnant and/or breastfeeding respondents, past-month use of cannabis and one or more other substances (i.e., as measured by this survey: tobacco, alcohol, opioids, psychedelics, benzodiazepines, and stimulants) increased by 19% and 23%, respectively.
- Fewer respondents reported always storing their medical cannabis in a safe, locked location in their home (62% vs. 54%). Those reporting "never" locking cannabis increased from 18% to 26%.

- One-third of 2023 respondents met the criteria for cannabis use disorder (not comparable to 2022 survey¹). While high, this is also consistent with reports from other studies on CUD rates in medical cannabis patients. A common indicator was spending a “great deal of time obtaining, consuming or recovering from cannabis use.”

5. Perceptions of risk and benefit may be changing quickly and may be relevant to adverse outcomes.

- Perceived efficacy of medical cannabis increased for all but one qualifying condition (anorexia). This finding is unexpected because there were few changes in how respondents used medical cannabis (i.e., frequency of use, dose).
- Many respondents perceived cannabis to be beneficial for mental health conditions, and very few reported considering potential harms. This is concerning, given potential adverse mental health outcomes reported in literature as well as the extent to which respondents may self-treat. (The survey did not assess whether this use of cannabis was guided by a healthcare professional.)
- Perceptions of risk related to cannabis use during pregnancy may be decreasing, evidenced by increased past-month use by pregnant and/or breastfeeding respondents. A related finding is heightened interest in public education related to cannabis use during pregnancy in 2023.

6. Perceptions of risk related to cannabis use should be addressed in future programmatic efforts.

- A combination of prevention and harm reduction strategies may be needed to balance risk perceptions and increase favorable outcomes.
- Recommendations include educational messaging campaigns informed by patient input and offering a brief digital intervention as a resource to patients that want to reduce their cannabis consumption. A dedicated cannabis quit line may also support those with problem use or interest in quitting.

¹ The 2023 survey used the validated Cannabis Use Disorder Identification Test (CUDIT), but the 2022 survey used a modified version of the scale; therefore, the findings cannot be directly compared.

Definitions and Acronyms

Cannabis flower/Flower — the smokable part of the cannabis plant

CBD — cannabidiol

Certified patient — an individual who has met their medical provider’s criteria for treatment with medical cannabis and for whom the provider has issued a certification

Concentrate — a cannabis product that is a highly concentrated form of cannabis, including dabs, wax, shatter, resin, and Rick Simpson Oil

Consumption — using cannabis products

Correlated — having a mutual relationship or connection

CUD— Cannabis Use Disorder

CUDIT— Cannabis Use Disorder Identification Test

Descriptive characteristics — a summary statistic that quantitatively describes or summarizes features from our sample

Dose — a quantity of cannabis products taken or recommended to be taken at a particular time, measured in mg/THC by combining the quantity and THC potency of cannabis consumed per sitting

DUIC — driving under the influence of cannabis; driving within 3 hours of consuming cannabis or while under the influence of cannabis

Edibles — food products infused with cannabis extract

Inferential findings — findings where statistical analysis was performed to identify and examine statistical relationship between variables and outcomes of interest

Medical cannabis use — cannabis used to relieve the symptoms of a medical condition

MCA — Maryland Cannabis Administration

MMCC — Maryland Medical Cannabis Commission

MMCPs — Maryland Medical Cannabis Patient Survey

Patients — people registered and certified to use medical cannabis in Maryland

Polysubstance use — the use of more than one substance, including but not limited to alcohol and opioids

Principal investigator — the individual responsible for the preparation, conduct, and administration of the study

Problematic use — a problematic pattern of cannabis use leading to clinically significant impairment or distress

PTSD — post-traumatic stress disorder

Qualifying conditions — cachexia, anorexia, wasting syndrome, severe or chronic pain, severe nausea, seizures, severe or persistent muscle spasms, glaucoma, PTSD, or another chronic medical condition that is severe and for which other treatments have been ineffective and the symptoms reasonably can be expected to be relieved by the medical use of cannabis

Nonmedical cannabis use — cannabis used for anything other than to relieve the symptoms of a medical condition

Respondents — Maryland medical cannabis patients who completed the MMCPs surveys

THC — Tetrahydrocannabinol

Vaping — the action of inhaling and exhaling aerosolized cannabis concentrate



Section 1. Research Methods and Respondent Demographics

1.1 Research Methods

The MMCPS-23 launched on Thursday, September 28, 2023, at 12:00 p.m. ET on the Qualtrics web survey platform. All active, certified medical patients over age 18 were invited to complete the survey, and patients volunteered to participate. An invitation to participate in the survey was sent to 151,307 patient email addresses through the Qualtrics distribution tool, and 1.3% (1,960) of the emails bounced back. The survey was open and collecting responses for 5 days. This timeframe was determined by two main goals: 1) to keep the survey open for about one week to provide patients with sufficient opportunity to provide feedback, and 2) to collect a similar number of complete responses as the MMCPS-22 (i.e., approximately 13,000). The survey closed 5 days after the launch date, at 9:00 a.m. ET on Tuesday, October 3. Of the 27,609 patients who initiated the survey, 1,894 were excluded for failing to pass Qualtrics' fraud detection technology (e.g., bot detection, duplicate responses), 1,963 were excluded for incorrectly answering a basic attention check question, and 7,304 were excluded for exiting the survey before fully completing it. The final sample size after exclusions and data cleaning consisted of 16,448 registered certified cannabis patients.



1.2 Respondent Demographics



For a complete review of demographic distributions, refer to Appendix A of the report. Select demographic characteristics of the 2022 and 2023 survey samples are summarized in Table 1. A majority of respondents in the 2023 survey sample were female (56.7%), White (75.5%), and between the ages of 36 and 45 (21.5%). Nearly one-quarter of the participants received a bachelor's degree (23.4%), and an additional third had completed some college or received an associate's degree (32.8%). Most respondents were employed full-time (49.9%), while 25.4% were retired. The median annual household income for respondents in this sample was \$62,500. The median length of time that respondents had been in the medical cannabis program was 3 years. Furthermore, the sample consisted of 125 (0.7%) pregnant and/or breastfeeding respondents, and nearly all (96%) survey respondents had active, current health insurance at the time of the survey.

Demographic characteristics between the 2022 and 2023 samples matched by 99% on average, which strengthens our confidence in the findings presented throughout the report, particularly when data from 2022 and 2023 are compared. Moreover, the 2022 and 2023 samples matched the actual patient population demographic characteristics by 98% and 99% on average, respectively, which strengthens our confidence in the generalizability of the survey findings to the full patient population.



Table 1. Demographic Distributions from the 2022 and 2023 Survey Samples, and the Actual Patient Population

Gender Identity

2022	53.8% Female	43.7% Male	1.2% Non-binary
2023	56.7% Female	40.7% Male	1.2% Non-binary

Level of Education

2022	32.1% Some college, associate degree	24.9% Bachelor's degree	19.4% Master's degree or PhD
2023	32.8% Some college, associate degree	23.4% Bachelor's degree	19.3% Master's degree or PhD

Employment

2022	56% Employed full time	18.1% Retired	8.3% Working part time
2023	56% Employed full time	18.1% Retired	8.3% Working part time

Annual Income (Median)

2022	\$62,500	2023	\$62,500
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Time Certified as a Medical Cannabis Patient (Median)

2022	Two years	2023	Two years
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Table 1. Demographic Distributions from the 2022 and 2023 Survey Samples, and the Actual Patient Population (Cont.)

County	2022 Sample (n=13,011)	2023 Sample (n=16,448)	2023 Patient Population (n=151,307)
Allegany	2%	2%	2%
Anne Arundel	11%	11%	12%
Baltimore	18%	17%	16%
Baltimore City	9%	9%	10%
Calvert	2%	2%	2%
Caroline	1%	1%	1%
Carroll	4%	4%	4%
Cecil	2%	3%	2%
Charles	2%	2%	2%
Dorchester	1%	1%	1%
Frederick	6%	6%	7%
Garrett	1%	.4%	.4%
Harford	6%	6%	6%
Howard	5%	5%	5%
Kent	.3%	.4%	1%
Montgomery	13%	12%	12%
Prince George's	6%	6%	7%
Queen Anne's	1%	1%	1%
Somerset	2%	0%	.4%
St. Mary's	0%	2%	2%
Talbot	1%	1%	.2%
Washington	3%	3%	1%
Wicomico	3%	2%	3%
Worcester	2%	2%	2%

Section 2. Patterns of Use

Key Findings



92%

There were no major changes in the frequency of qualifying conditions between survey years. Chronic pain, other chronic conditions, and PTSD were the most common and accounted for 92% of the 2022 and 2023 survey samples. Key pattern-of-use variables were also mostly consistent from 2022 to 2023.

Patients' use of medical cannabis for "other chronic conditions" was explored, showing frequent use for anxiety, insomnia, and depression.

On average, respondents spent less on medical cannabis per purchase in 2023. This was also true for spending by product type (flower, edible, vape, and concentrates).



An additional 1% of respondents used cannabis in the month preceding the 2023 survey (96% versus 97%); average days of use in the past month increased from 21.3 to 22.1 days per month; and the most common methods of administration remained flower, edibles, vape, and concentrates.



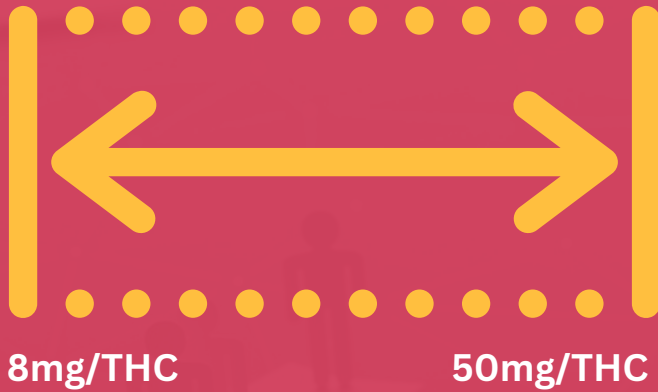
Overall, approximately 1 in 3 respondents used medical cannabis for a mental health condition, namely PTSD, anxiety, depression, or insomnia.

Seventy-seven percent (77%) of respondents perceived medical cannabis to be "very" or "extremely" effective for their qualifying condition, representing a statistically significant 4% increase from 2022.

Section 2. Patterns of Use

Key Findings

Average Dose per Occasion Range

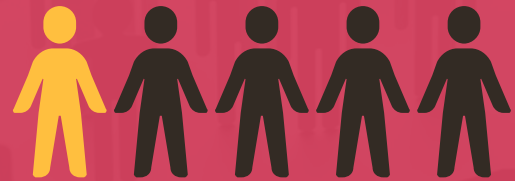


Doses per occasion typically ranged between 8 and 50 mg/THC (medians). These are likely higher than necessary, given evidence from clinical studies suggesting the medical effects tend to occur around 5 to 10 mg/THC.^{2,3} MCA should monitor emerging scientific research and clinical recommendations for medical cannabis doses.

Dose (mg/THC) per occasion was consistent from 2022 to 2023, which aligns with the minimal changes observed in other pattern-of-use variables. These findings contribute validity to the study's self-report method of measuring dose.



The number of respondents using cannabis solely for medical purposes increased 4% from 2022 to 2023. Few respondents said they had purchased cannabis without their medical card (i.e., as an adult-use consumer).



Cannabis use to alter consumption of other substances was common. Reports of using cannabis to alter opioid and benzodiazepine use were consistent from 2022 to 2023. Additional substances were measured in 2023, which revealed that 1 in 5 respondents used cannabis to reduce their consumption of alcohol; doing so was associated with greater frequency of simultaneous cannabis and alcohol use. Risks of polysubstance use should be considered.

[2]Freeman, T. P., & Lorenzetti, V. (2020). 'Standard THC units': a proposal to standardize dose across all cannabis products and methods of administration. *Addiction*, 115(7), 1207–1216. <https://doi.org/10.1111/add.14842>

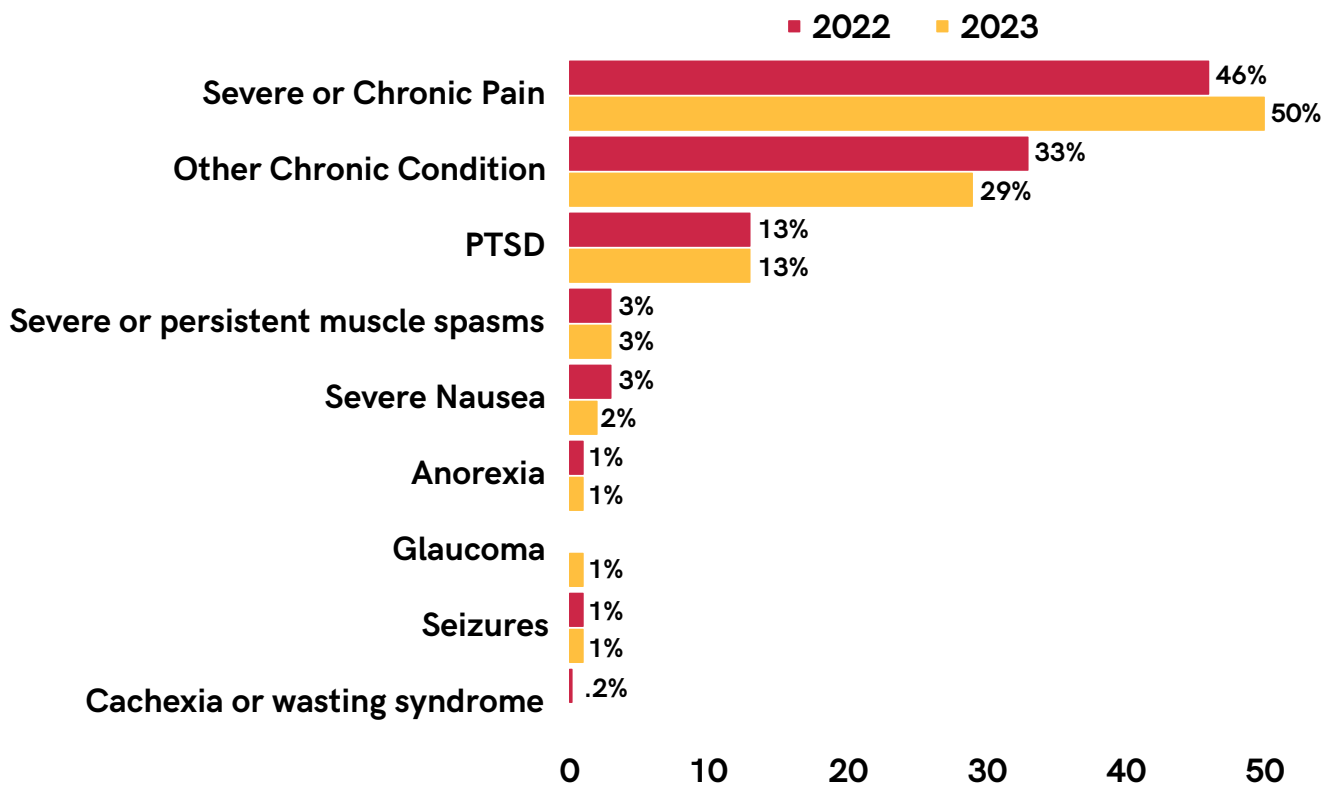
[3] Schlienz, N. J., Spindle, T. R., Cone, E. J., Herrmann, E. S., Bigelow, G. E., Mitchell, J. M., ... & Vandrey, R. (2020). Pharmacodynamic dose effects of oral cannabis ingestion in healthy adults who infrequently use cannabis. *Drug and alcohol dependence*, 211, 107969. <https://doi.org/10.1016/j.drugalcdep.2020.107969>



2.1. Have patients' qualifying medical conditions changed since adult-use legalization?

Comprehensive data on the health conditions for which patients use medical cannabis is sparse, especially at a national level, as approved conditions for medical use vary widely from state to state. The National Institute on Drug Abuse and many researchers have called for a national medical cannabis registry that tracks patients' medical conditions, products being used efficacy, and health outcomes.^{4,5} This type of data is crucial for expanding scientific knowledge about medical cannabis and informing research, policy, and clinical recommendations. The MMCPS study contributed to that dearth of data by reporting patients' qualifying conditions, including quantifying common conditions among those who are registered under the "other chronic condition" option. Qualifying conditions were reported at relatively consistent frequencies in the 2022 and 2023 survey samples, presented in Figure 1. Severe or chronic pain, "other chronic condition," and PTSD were the three most commonly reported conditions in both survey years. In 2023, severe or chronic pain was reported by half (50%) of respondents.

Figure 1. Frequency of Qualifying Conditions- 2022 and 2023



[4] Department of Health and Human Services. (2022, June 14). Registry of medical cannabis use and health outcomes (UM1 - clinical trial optional) (Funding Opportunity Announcement Number RFA-DA-23-011). <https://grants.nih.gov/grants/guide/rfa-files/RFA-DA-23-011.html>

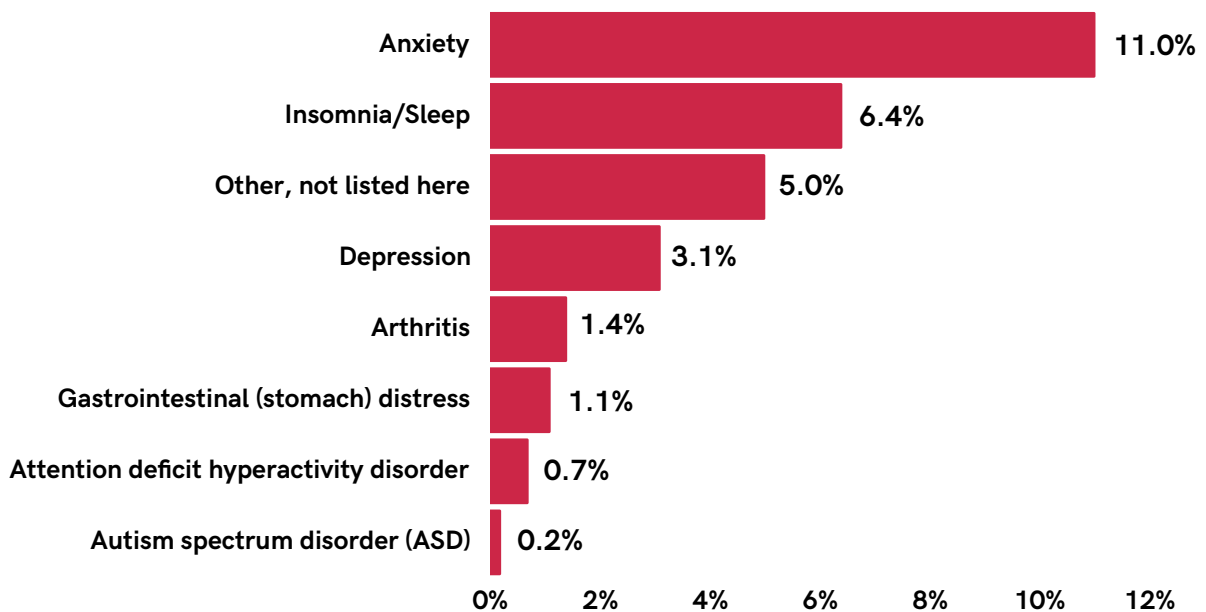
[5] Boehnke, K. F., Gangopadhyay, S., Clauw, D. J., & Haffajee, R. L. (2019). Qualifying conditions of medical cannabis license holders in the United States. *Health Affairs*, 38(2), 295–302. <https://doi.org/10.1377/hlthaff.2018.05266>



The MMCPs-23 included a new question to quantify medical cannabis use for non-qualifying conditions among those who are registered under the “other chronic condition” option. The survey presented a multiple-choice question to the 29% of respondents who reported “other chronic condition” as their qualifying condition. The list of response options (see Figure 2; note that these conditions are not currently on the qualifying conditions list) was informed by an open-text field in the MMCPs-22 that asked respondents who were qualified for “other chronic condition” to specify the condition or symptom for which they use medical cannabis. Anxiety (11%) and insomnia (6%) were the most common, followed by other (5%) and depression (3%); these findings were consistent with the qualitative responses from 2022.

Notably, mental health conditions appeared to lead to medical cannabis use for a considerable portion of the population. A total of 26% of the survey sample reported using cannabis for PTSD, anxiety, or depression, and another 6% reporting using cannabis for insomnia, which can be a symptom of mental health disorders.⁶ Corroborated by previous studies that showed a high frequency of mental health conditions among medical cannabis patients,⁷ this finding is important not only for broader policy and public health considerations, but also for patient education. Respondents in the MMCPs-23 signaled their interest in and need for mental health education, which was explored further in the MMCPs-23 (detailed in Section 3.7 of this report).

Figure 2. Medical cannabis uses among patients registered under “Other chronic conditions”



[6] Khurshid, K. A. (2018). Comorbid insomnia and psychiatric disorders: An update. *Innovations in Clinical Neuroscience*, 15(3–4), 28–32. <https://pubmed.ncbi.nlm.nih.gov/29707424/>

[7] Azcarate, P. M., Zhang, A. J., Keyhani, S., Steigerwald, S., Ishida, J. H., & Cohen, B. E. (2020). Medical reasons for marijuana use, forms of use, and patient perception of physician attitudes among the US population. *Journal of General Internal Medicine*, 35(7), 1979–1986. <https://doi.org/10.1007/s11606-020-05800-7>

2.2. Have frequency of use or preferred methods changed since adult-use legalization?

A primary reason for the pre/post survey design was to examine how changes in the legalization landscape related to patients' patterns of use, including frequency and methods of administration and dosage. Respondents were asked to report past-month patterns of cannabis use, including the number of days they used each method of administration (see Table 2). Frequency of use in the past month was relatively consistent from 2022 to 2023, with a very slight shift toward more days of past-month use (21.3 and 22.1 days, respectively). Flower was used most frequently (11.7 days per month, on average), followed by vaping (8.5 days) and edibles (7.8 days).

Each method was also examined individually (i.e., any use or no use of this method in the past month). In 2023, edibles surpassed flower as the method of administration used by the largest percent of the survey sample in the past month; 70% used edibles in the past month and 69% used flower. Past-month use of flower, vape, capsules, and concentrates declined in 2023, while use of transdermal patch and topical products increased.





Table 2. Past-Month Use by Method of Administration

Method	Average days of use in past month		Percentage of sample reporting any past-month use	
	2022	2023	2022	2023
Any Method	21.3	22.1	96%	97%*
Flower	12.9	11.7*	75%	69%*
Edibles	7.1	7.8*	69%	70%
Vaporizer/ Cartridge	8.9	8.5*	65%	62%*
Concentrates	2.2	1.9*	18%	17%*
Capsules or Tablets	1	1	13%	11%*
Tinctures or Oral Sprays	1	1	12%	12%
Topicals	1.9	2.2*	22%	24%*
Transdermal	0.1	0.2	1.5%	2%*
Rectal/ Vaginal Suppositories	0	0.1	1%	1%

* Change from 2022 to 2023 is statistically significant (p = .05)



Approximately 10% (n = 1,602) of MMCPs-23 respondents have served in the U.S. armed forces, in the reserves, or in the National Guard. The majority (29%) of veterans in the sample were 66 to 75 years old. As in the full sample, the most common conditions among veterans were severe or chronic pain (53%), other chronic condition (20%), and PTSD (20%). Similar to the full sample, the most common methods of administration in the past month among veterans were flower, edibles, and vaping (68%, 67%, and 55%, respectively).

Frequency and methods of administration were also examined within demographic subgroups, however, there was little to no variation in the data when split by subgroups (see Appendix B). For example, when days of use per method was analyzed by age group, gender identity, and race, flower was the primary method of administration (i.e., used most frequently in the past month) by nearly all subgroups.

2.3. What is the perceived efficacy of medical cannabis?

Data on patients' perceived efficacy of medical cannabis can be valuable for informing research, policy, and programmatic developments. The current study provides insights on efficacy for various medical conditions and pattern-of-use measures. Perceived efficacy of medical cannabis for respondents' qualifying conditions was measured on a Likert scale from 0 to 4: *Not at all*, *A little*, *Somewhat*, *Very*, and *Extremely*.

More than three-quarters (77%) of MMCPs-23 participants reported medical cannabis as very or extremely effective for their qualifying condition, which represents a slight increase from 73% reporting the same in 2022. Responses for each qualifying condition are presented in Table 3. Greatest efficacy was reported for severe nausea (90%), followed PTSD (85%). Among "other chronic conditions," medical cannabis for the mental health conditions—*anxiety*, *insomnia*, and *depression*—was endorsed as highly effective by 84%, 80%, and 79% of respondents, respectively. Perceived effectiveness was lowest for glaucoma, with just 59% of respondents reporting medical cannabis to be very or extremely effective. Adverse cannabis-related experiences like panic, anxiety, and suicidal ideation were not assessed in the current survey, as rates were found to be relatively low in the MMCPs-22 and unlikely to vary much year-to-year. Notably, very few respondents were treated in 2022 or 2023 at an emergency room or urgent care facility for any reason related to cannabis use (2% and 1%, respectively).

Table 3. Percentage of Respondents Who Reported Medical Cannabis Was Very or Extremely Effective, by Qualifying Condition

Qualifying Condition	2022	2023
Severe nausea	81%	90%
PTSD	82%	85%
Anorexia	86%	84%
Seizures	81%	82%
Severe or persistent muscle spasms	66%	79%
Severe or chronic pain	70%	74%
Cachexia or wasting syndrome [^]	65%	72%
Glaucoma	--	59%

--' signifies that no data was collected.

[^] Small sample size (n < 30)

* Refer to Section 2.1. Qualifying Medical Conditions for details on other chronic conditions.

Table 3. Percentage of Respondents Who Reported Medical Cannabis Was Very or Extremely Effective, by Qualifying Condition (Cont.)

Qualifying Condition	2022	2023
Other Chronic Conditions*	78%	80.4%
Anxiety	--	84%
Insomnia	--	80%
Depression	--	79%
Gastrointestinal Distress	--	78%
ADHD	--	77%
Arthritis	--	74%
Autism Spectrum Disorder ^	--	65%

-- signifies that no data was collected.

^ Small sample size (n < 30)

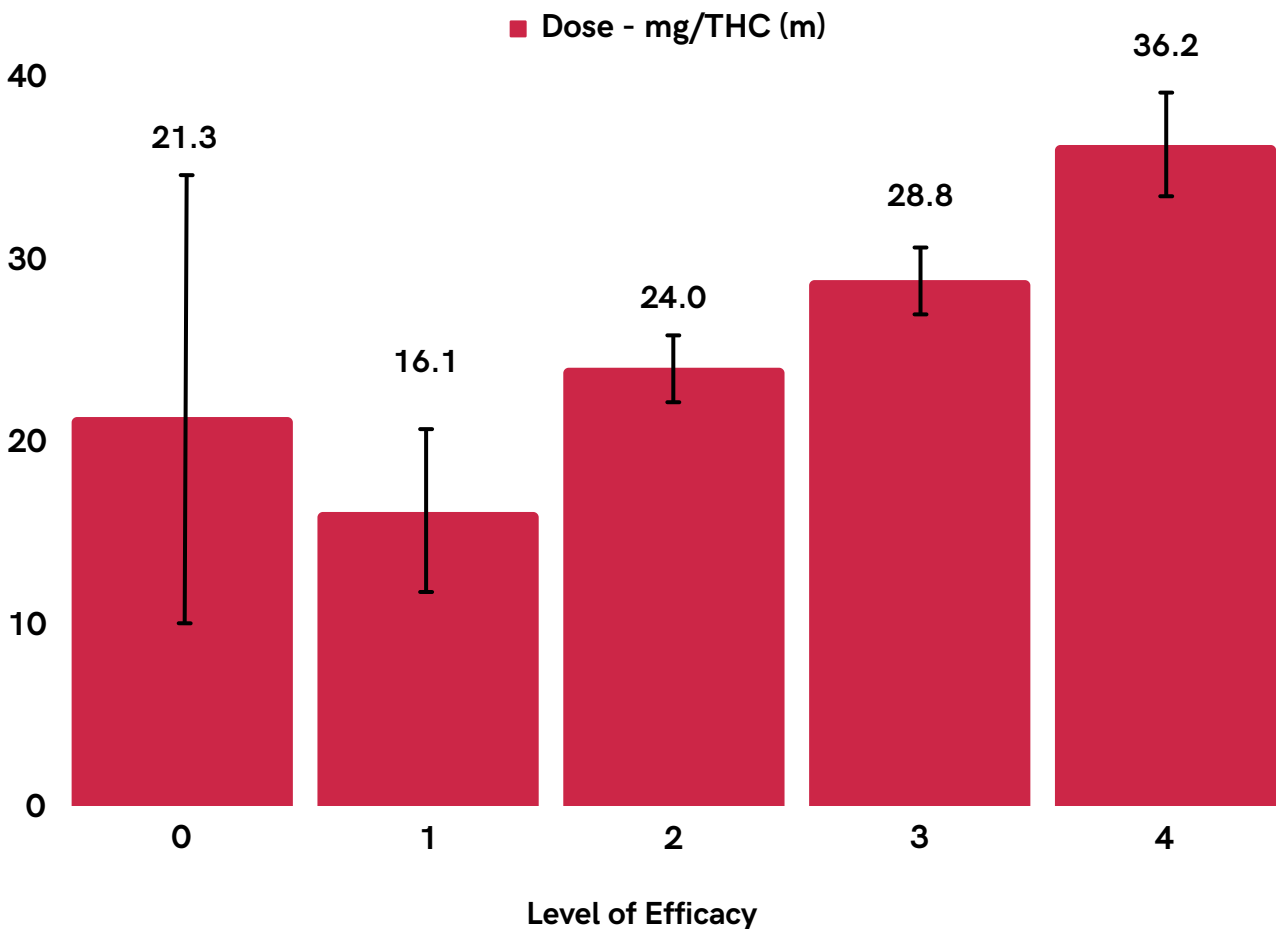
* Refer to Section 2.1. Qualifying Medical Conditions for details on other chronic conditions.

Findings in this table are not intended as medical advice. Consult a healthcare provider for medical concerns.



The relationship between perceived efficacy and THC dose was explored. A low-strength yet statistically significant relationship was observed between perceived efficacy and THC dose using a bivariate correlation test ($r = .09$, $p < .001$). Furthermore, each increasing level of perceived efficacy (Not at all to Extremely) corresponded to an increase in average THC dose (see Figure 3), and, among methods of administration, edibles had the strongest correlation between dose and perceived efficacy ($r = .126$, $p < .001$). While findings suggest higher doses may have produced greater perceived efficacy, a stronger correlation was observed with frequency of use and perceived efficacy ($r = .245$, $p < .001$). Future research that expands upon perceived efficacy may help inform healthcare providers' guidance on the use of medical cannabis. Future studies on efficacy should also record patients' medical cannabis products and potencies of choice, as well as their experiences with adverse health effects.

Figure 3. Average Dose (mg/THC) by Reported Level of Efficacy, 2022 and 2023 Samples Pooled

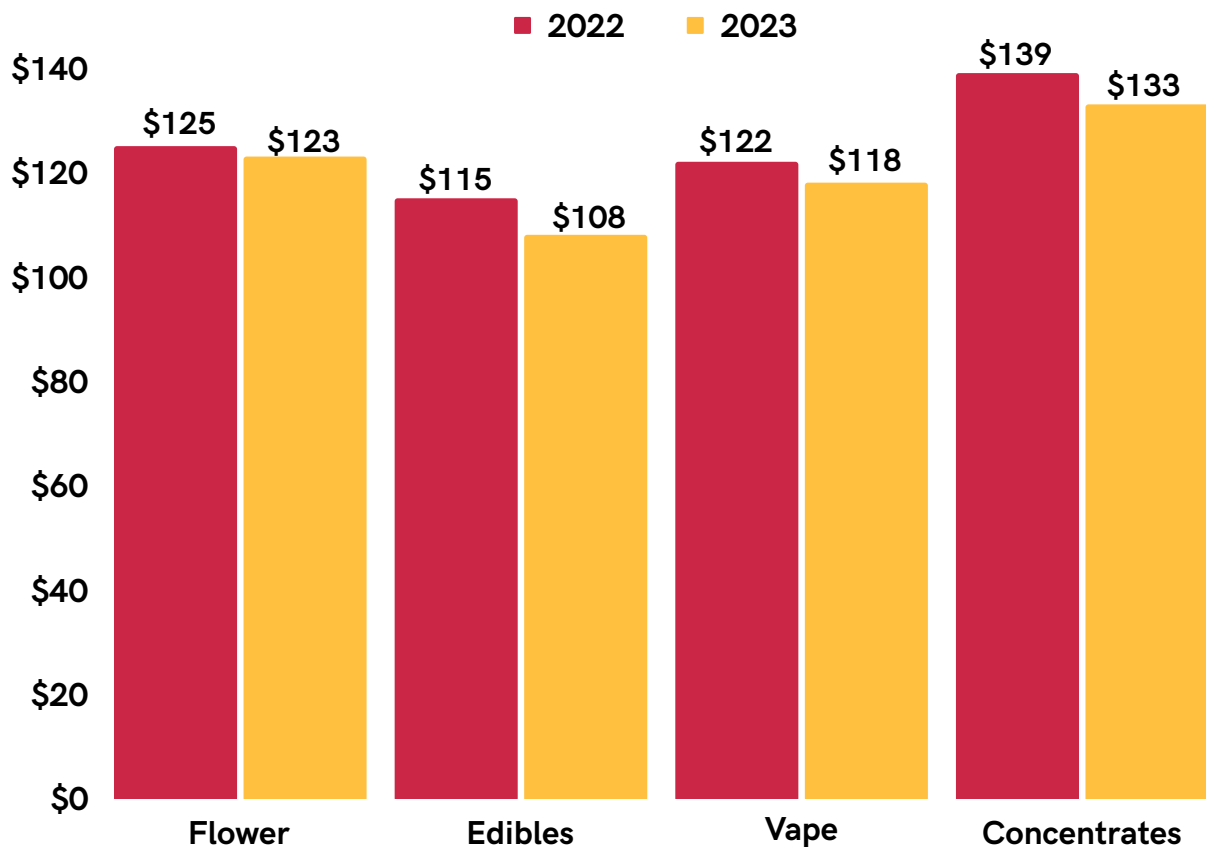




2.4. How much do medical patients spend per transaction?

Respondents were surveyed on the amount of money they typically spend when purchasing medical cannabis. Findings show that patients generally spent less on medical cannabis in 2023 than in 2022. These findings are consistent with MCA’s 2022 report on patient spending patterns, which showed patient annual spending increasing from 2018 to 2020, at which point it began to decrease and is projected to continue doing so.⁸ The average amount spent among the 2023 survey respondents was \$118 per purchase, which was significantly lower than the 2022 respondents’ \$122 per purchase. When assessed by the four most common methods of administration—flower, edibles, vape, and concentrates—the average amount spent per purchase decreased by \$2 to \$7, on average (see Figure 4).

Figure 4. Average Amount Spent per Purchase, 2022 and 2023

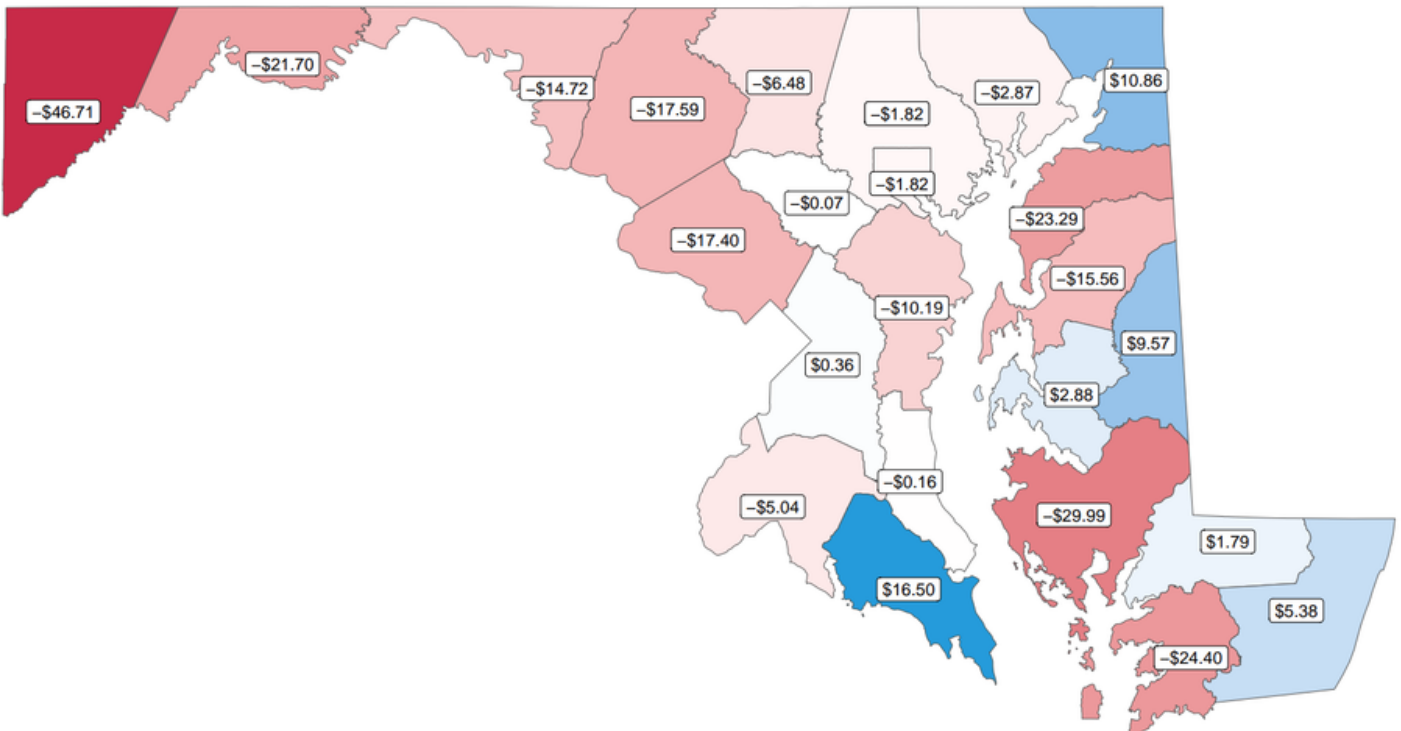


[8] Maryland Medical Cannabis Commission. (2022, December). Report on the number of medical cannabis providers, amount of medical cannabis sold, and average consumer price. https://dlslibrary.state.md.us/publications/Exec/MDH/MMCC/HG13-3305_2023.pdf



The map in Figure 5 shows the average change in amount spent per purchase from 2022 to 2023 by county. The largest decreases in spending were seen in Garrett County (\$46.70 less per purchase) and Dorchester County (\$30 less per purchase); the largest increases were seen in St. Mary's County (\$16.50 more per purchase) and Cecil County (\$10.90 more per purchase). Howard, Calvert, and Prince George's Counties had almost no change in average amount spent per purchase (i.e., plus or minus two to four cents). Changes in patient spending is likely unrelated to changes in consumption; past-month use only increased slightly from 2022 to 2023. Future research could elucidate whether these changes (especially at the county level) are related to policy and regulation and, if so, explore approaches to minimize adverse impacts on medical patients.

Figure 5. Change in Average Amount Spent per Purchase, 2022 to 2023, by County





2.5. Is primary use of edibles associated with more favorable patterns of use?

Findings from the 2022 survey suggested that using edibles as the primary method of administration may be protective against some cannabis-related adverse outcomes. Specifically, edibles as the primary method produced a significantly lower likelihood of driving under the influence of cannabis (DUIC) in 2022, and those findings were replicated with the 2023 survey respondents. Once again, consuming edibles as the primary method was associated with fewer days of cannabis use per month, lower dose per occasion, and lower score on the Cannabis Use Disorder Identification Test (CUDIT). Future research is needed to draw conclusions about the protective factors of edibles compared to other methods of consumption.

2.6. How much medical cannabis is consumed for nonmedical reasons?

Participants were asked what percentage of their cannabis use in the past month was for medical versus nonmedical purposes. Slightly more respondents reported using cannabis entirely for medical purposes in 2023 versus 2022 (70% vs. 66%), although this increase should be interpreted with some caution due to a minor change in how the question was phrased. Not surprisingly, more nonmedical cannabis use was observed among respondents who said they do not plan to stay in the medical program after their current certification expires. When examined by qualifying conditions, use of cannabis for seizures and severe/chronic pain was associated with the highest rates of cannabis use solely for medical purposes in 2023 (74% and 72%, respectively). Relatedly, few respondents (8%) said they had purchased cannabis without their medical card since the start of adult-use sales (i.e., as an adult-use consumer).

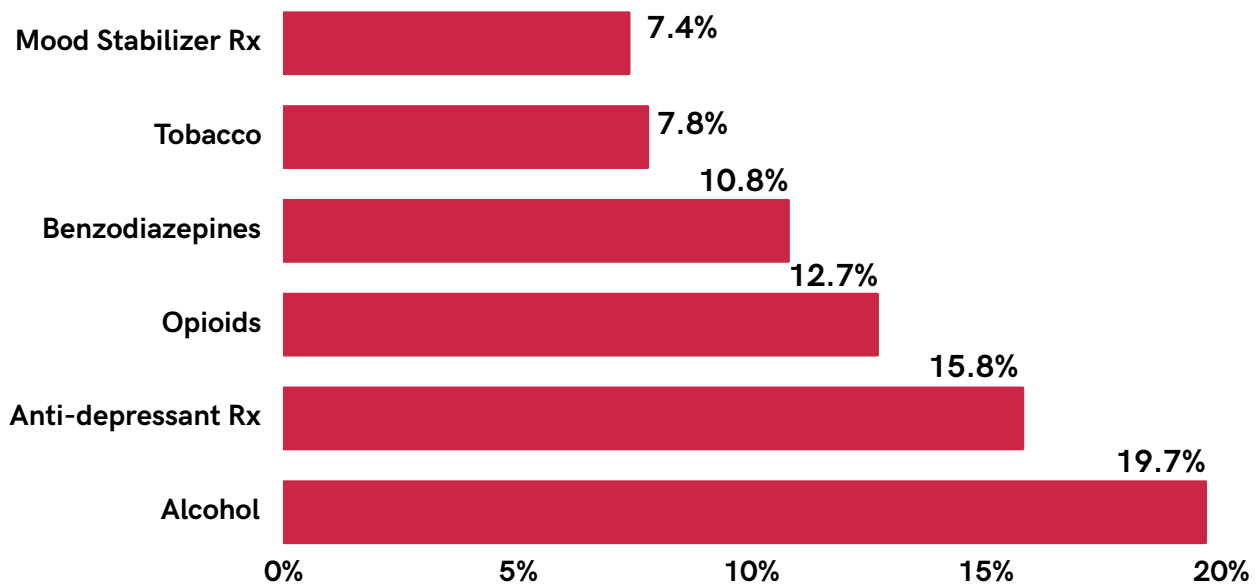
2.7. How often is cannabis consumed to alter consumption of alcohol, tobacco, or other substances?

Respondents were asked whether they had consumed cannabis to reduce, replace, or stop the use of prescription medications and other substances in the past year. The 2022 survey asked about opioids and benzodiazepines, and the 2023 survey added anti-depressants, mood stabilizers, alcohol, and tobacco to the questionnaire. Overall, 43.9% of respondents reported using cannabis to alter their use of one or more of these substances.



Approximately one-fifth (19.7%) of participants consumed cannabis to alter their use of alcohol, and a considerable portion altered their use of anti-depressants (15.8%), opioids (12.7%), and benzodiazepines (10.8%; see Figure 6). Cannabis consumption to alter the use of mood stabilizers and tobacco was reported by 7% and 8% of the sample, respectively. Compared to the 2022 sample, cannabis to alter opioid use was reported by 1% more respondents in 2023, and cannabis for altering benzodiazepine use was reported by 2% fewer respondents in 2023.

Figure 6. Percentage of 2023 Respondents Who Consumed Cannabis to Alter Use of Each Substance



Notably, using cannabis to alter alcohol use was associated with a lower perceived risk of harm related to simultaneous use. In the present literature, co-use of substances, including alcohol and tobacco, is associated with an increased risk of potential harms, including substance use disorders (e.g., cannabis use disorder, alcohol use disorder), driving while impaired, psychiatric disorders, and mental health symptom severity.^{9 10} People who consume alcohol and cannabis simultaneously also experience greater acute effects (e.g., “feeling high,” dizziness, difficulty concentrating, confusion) compared to when consuming alcohol or cannabis individually.¹¹

[9] Karoly, H. C., Prince, M. A., & Conner, B. T. (2023). Alcohol first, cannabis last: Identification of an especially risky use pattern among individuals who co-use alcohol and cannabis. *Substance Use & Misuse*, 1–10. <https://doi.org/10.1080/10826084.2023.2270674>

[10] Yurasek, A. M., Aston, E. R., & Metrik, J. (2017). Co-use of alcohol and cannabis: A review. *Current Addiction Reports*, 4, 184–193. <https://doi.org/10.1007/s40429-017-0149-8>

[11] Lee, C. M., Cadigan, J. M., & Patrick, M. E. (2017). Differences in reporting of perceived acute effects of alcohol use, marijuana use, and simultaneous alcohol and marijuana use. *Drug and alcohol dependence*, 180, 391–394. <https://doi.org/10.1016/j.drugalcdep.2017.08.029>



Greater intensity of these acute effects may pose additional risks to individuals who consume alcohol and cannabis simultaneously. Given the frequency of cannabis use to alter other substances, further research is warranted. Additionally, healthcare providers may want to explore this relationship and consider screening patients for polysubstance use.

Table 4 displays demographic characteristics and substance use patterns for those who did and did not consume cannabis to alter alcohol consumption, which may be insightful for targeted research or education efforts related to polysubstance use. Compared to those who did not (80%, n = 13,146) respondents who did report consuming cannabis to alter their alcohol intake (20%, n = 3,229) tended to be younger and have a higher annual income. Consuming cannabis to alter alcohol intake was associated with a larger male demographic by 8%, as well as twice as many days per month consuming alcohol (8 vs 4 days, on average), and half as many days per month consuming opioids (.5 vs 1 day, on average). Cannabis use frequency and THC dose were the same for both those who did and did not consume cannabis to alter alcohol consumption (see Table 4).

Table 4. Characteristics Between Those Who Did- and Did Not Consume Cannabis to Alter Alcohol Consumption

“In the past year, did you consume cannabis to replace, reduce, or stop consumption of alcohol?”

	No (n = 13,146)	Yes (n = 3,229)
Age (majority)	46 - 55 years	36 - 45 years
Gender		
Male	39%	47%
Female	59%	50%
Another Gender	2%	3%
Days of Substance Use Per Month (m)		
Alcohol	4.1 days	7.7 days
Cannabis	22 days	22 days
Opioids	1.2 days	.5 days
THC dose per occasion (mdn)	27 mg/ THC	27 mg/THC



2.8. What is the typical dose per occasion (mg/THC)?

There is growing recognition of the importance of a standard “dose” of THC to help patients and adult-use consumers monitor their use. Current recommendations suggest that a 5–10mg THC dose can provide medicinal benefits of cannabis without adverse or impairing effects, such as paranoia, restlessness, anxiety, or “feeling high.”^{12 13} However, cannabis dose can be challenging for consumers to conceptualize, considering the diverse nature of cannabis consumption in terms of product types and potencies. Dose can also be difficult for participants to self-report accurately. Currently, a best practice to measure a standard THC dose across cannabis products does not exist. Dose is often easiest to conceptualize with edibles because they are packaged in mg/THC units. It is more difficult to assess dose with inhaled products (e.g., flower, concentrates) due to the separation of amount/quantity and potency of THC on package labeling. Furthermore, there are differences in bioavailability of inhaled and oral THC. Despite these complexities, the relative consistency between survey data collected in 2022 and 2023 suggests that it is possible to measure dose in a self-report survey format.

The MMCPs-22 and the MMCPs-23 each measured dose. In the time between the two surveys, MCA and Cannabis Public Policy Consulting (CPPC) worked diligently to refine their approach to measuring dose per occasion of cannabis use. Though the same survey questions were used in the 2022 and 2023 surveys, a new approach was used for calculating dose, which was informed by recently published research in the scientific literature.¹⁴ The current report includes updated dose calculations from the 2022 survey participants, so that the 2022 and 2023 survey responses can be compared side by side.¹⁵

Table 5. Median Dose per Occasion (mg/THC) by Product Type

	↑ Flower	☒ Edible	↓ Vape	↑ Concentrate
2022	45	8	19.2	42.3
2023	47.3	8	16	49.7

[12] Freeman, T. P., & Lorenzetti, V. (2020). ‘Standard THC units’: a proposal to standardize dose across all cannabis products and methods of administration. *Addiction*, 115(7), 1207–1216. <https://doi.org/10.1111/add.14842>

[13] Schlienz, N. J., Spindle, T. R., Cone, E. J., Herrmann, E. S., Bigelow, G. E., Mitchell, J. M., ... & Vandrey, R. (2020). Pharmacodynamic dose effects of oral cannabis ingestion in healthy adults who infrequently use cannabis. *Drug and alcohol dependence*, 211, 107969. <https://doi.org/10.1016/j.drugalcdep.2020.107969>

[14] Budney, A. J., Borodovsky, J. T., Struble, C. A., Habib, M. I., Shmulewitz, D., Livne, O., Aharonovich, E., Walsh, C., Cuttler, C., & Hasin, D. S. (2022). Estimating THC consumption from smoked and vaped cannabis products in an online survey of adults who use cannabis. *Cannabis and Cannabinoid Research*. <https://doi.org/10.1089/can.2022.0238>

[15] MMCPs-22 report has been updated to reflect the revised dose calculations.



Dose has remained relatively consistent across survey years. Overall, the median dose per occasion was 27.6 mg/THC in 2022 and 27 mg/THC in 2023. When observed by product type, flower and concentrate doses increased by approximately 2 and 7 mg/THC, respectively, vape decreased by approximately 3 mg/THC, and edible remained the same (see Table 5). Interestingly, the median dose per occasion for flower (47.3 mg/THC) was almost three times higher than vape (16 mg/THC) and similar to concentrate (49.7 mg/THC) despite many vape and concentrate products having higher potencies of THC; this is likely related to respondents using larger amounts of flower per sitting compared to vape and concentrates. Due to the minimal variation in dose across survey years, the 2022 and 2023 samples were pooled together to produce a larger sample size. Doing so allowed for deeper analyses of dose, such as exploring median cannabis dose within groups based on demographics and qualifying conditions (see Table 6).

Dose produced low-strength correlations with several important outcomes ($r_s = .1$ to $.21$, $p_s < .001$). For example, higher dose was associated with the following characteristics: younger age, higher perceived efficacy of medical cannabis, lower perceived risk of harm of DUI, and lower perceived stigma related to cannabis use. Additionally, higher dose was associated with the following behaviors: spending more per cannabis purchase, smoking cannabis inside the home, more frequent cannabis use, more frequent tobacco use, and less alcohol use. Dose also produced low strength yet statistically significant correlations with several other outcomes, such as higher cannabis use disorder (CUD) identification test scores and greater frequencies of DUI, use of psychedelic substances, use of opioids, vaping in the home, and cannabis-related hospitalizations ($r_s = .02$ to $.07$, $p_s < .001$).

In an effort to identify key variables for monitoring cannabis use and related outcomes, these low-strength and weak correlations are worth noting, especially since emerging research suggests that other patterns of use may be more useful than dose for assessing cannabis-related risks.¹⁶ The MMCPs survey responses may provide evidence to support that theory, since frequency of past-month cannabis use produced stronger correlations with many of the variables mentioned above, especially frequency of DUI, smoking and vaping cannabis in the home, and perceived efficacy of medical cannabis ($r_s .24$ to $.26$, $p_s < .001$).

[16] Sagar et al. (2021). Assessing cannabis use disorder in medical cannabis patients: Interim analyses from an observational, longitudinal study. *Cannabis*, 4(2), 47–59. <https://doi.org/10.26828/cannabis/2021.02.004>



The MMCPs study yielded many important insights on dose that should be considered during future research and monitoring of the medical patient population.

1

Firstly, the consistency in dose findings across survey years is notable, as similar findings occurred with related pattern-of-use variables (e.g., frequency of use, methods of administration, and qualifying conditions). Because there was very little change in those pattern-of-use variables across years, it would be logical to expect little to no change in dose, which is exactly what emerged in the results. Together, these findings contribute validity to the self-report method used to measure dose in the MMCPs study.

2

Secondly, dose can be informative for monitoring cannabis use trends over time, and it would likely be valuable for MCA to continue measuring self-reported dose per occasion. However, given the stronger correlations observed between several outcomes and frequency of use, future surveillance efforts should also continue to include isolated pattern-of-use measures, such as frequencies and amounts.

3

Finally, respondents' doses per occasion, which typically ranged between 8 and 50 mg/THC, depending on method of administration, are likely somewhat higher than what is necessary for obtaining the medical benefits of cannabis. Many clinical studies are currently reporting that the medical effects tend to occur around 5 to 10 mg/THC.^{17 18} MCA should monitor emerging scientific research and clinical recommendations on medical cannabis doses.

[17] Freeman, T. P., & Lorenzetti, V. (2020). 'Standard THC units': a proposal to standardize dose across all cannabis products and methods of administration. *Addiction*, 115(7), 1207–1216. <https://doi.org/10.1111/add.14842>.

[18] Schlienz, N. J., Spindle, T. R., Cone, E. J., Herrmann, E. S., Bigelow, G. E., Mitchell, J. M., ... & Vandrey, R. (2020). Pharmacodynamic dose effects of oral cannabis ingestion in healthy adults who infrequently use cannabis. *Drug and alcohol dependence*, 211, 107969. <https://doi.org/10.1016/j.drugalcdep.2020.107969>



Table 6. Median Dose (mg/THC) by Method of Administration and Demographic Characteristics, 2022 and 2023 Samples Pooled

	mg/THC per Occasion (m)				
	Flower	Edible	Vape	Concentrate	Overall
Full sample (2022 & 2023, pooled)	45	8	18	43	27
	Gender identity				
Male	45	8	20	49.7	33.8
Female	47.3	8	16	42.3	25.5
Transgender female	49.5	^	^	^	26.3
Transgender male	73.1	^	^	^	40.5
Nonbinary	50	8	23	^	30.2
Other, not included above	^	^	^	^	33.8

^ very small sample size (n < 10)

(m) = mean or average

Note: Data from 2022 and 2023 were pooled because of extremely limited differences between years.



Table 6. Median Dose (mg/THC) by Method of Administration and Demographic Characteristics, 2022 and 2023 Samples Pooled (Cont.)

mg/THC per Occasion (m)					
	Flower	Edible	Vape	Concentrate	Overall
Age group					
18 to 20	54	8	26.6	56.3	43.6
26 to 35	63	8	16.9	42.3	36
36 to 45	60.8	8	15.9	42.25	33.8
46 to 55	47.3	8	18.1	37.5	27
56 to 65	45	8	17.7	49.7	25.5
66 to 75	33.8	8	16.1	39.8	18
76 or older	45	8	13.3	^	13.3

^ very small sample size (n < 10)

(m) = mean or average

Note: Data from 2022 and 2023 were pooled because of extremely limited differences between years.



Table 6. Median Dose (mg/THC) by Method of Administration and Demographic Characteristics, 2022 and 2023 Samples Pooled (Cont.)

	mg/THC per Occasion (m)				
	Flower	Edible	Vape	Concentrate	Overall
	Qualifying Condition				
Anorexia	47.3	10.5	16	33.8	33.8
Severe or persistent muscle spasms	47.3	8	15.1	74.5	27
Seizures	90	8	12.2	^	54
Severe or chronic pain	45	8	18.1	42.3	27
Cachexia or wasting syndrome	40.5	^	^	^	27
PTSD	59.3	8	18.1	49.7	33.8
Severe nausea	54	8	17.1	42.3	37.4
Other chronic condition	45	8	16.9	47.3	26.3
Glaucoma	63	13	^	^	34.9

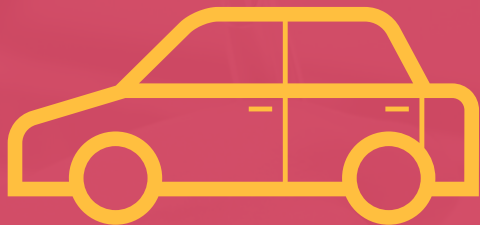
^ very small sample size (n < 10)
(m) = mean or average
Note: Data from 2022 and 2023 were pooled because of extremely limited differences between years.

Section 3. Public Health Indicators

Key Findings



Practicing safe storage of medical cannabis declined in the past year. Patients may benefit from education on purchasing affordable safe storage devices (e.g., lockable baggies). Risk perceptions, which may have been altered by expanded legalization of cannabis (i.e., adult-use legalization) should continue to be measured.



Past-month prevalence of DUIC doubled from 2022 to 2023, and perceived risks of DUIC were far lower than perceived risks of driving under the influence of alcohol. Only half of respondents (55%) said DUIC was moderately or very harmful, versus 98% who said the same about driving under the influence of alcohol. Education on the risks of DUIC and continued surveillance on patterns and perceptions of DUIC in the patient population is warranted.

Non-homeowners (i.e., respondents who rent or have other living situations such as living with a friend or family) reported higher frequency of smoking or vaping cannabis in public spaces as well as in their parked cars (which is associated with DUIC); however, many renters said their lease did not prohibit use or they were unsure of their rental policy on cannabis use, so rental agreements alone may not fully explain public consumption.



One-third of respondents met criteria for cannabis use disorder (CUD), which was associated with higher frequency of use, higher THC dose, and more days of DUIC per month. Respondents who met the criteria for CUD expressed higher interest in cutting back their cannabis use and greater support for a state-sponsored cannabis quit line.

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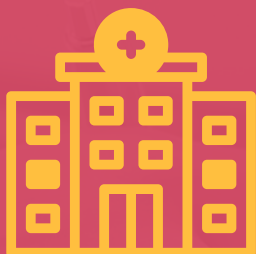
Section 3. Public Health Indicators

Key Findings

Mental health was among respondents' top two educational priorities in both survey years, and follow-up questioning in 2023 revealed that very few respondents may be considering potential harms to mental health with cannabis use.



Among pregnant and/or breastfeeding respondents, from 2022 to 2023, past-month cannabis use increased by 19% and past-month use of one or more other substances increased by 23%. (The survey measured past-month use of tobacco, alcohol, psychedelics, benzodiazepines, stimulants, and opioids.) The findings suggest an opportunity to increase education for women of childbearing age about the potential risks of and safer alternatives to cannabis for conditions such as pregnancy-related nausea or pain.



Survey findings conveyed a gap between patients' medical cannabis use and their relationships with healthcare professionals. "Educating healthcare professionals about cannabis use" was ranked the most important educational topic among survey respondents, and stigma was reported to be the highest when discussing cannabis use with healthcare professionals (compared to friends, family, or primary care provider). Efforts to reduce stigma may result in improved care and patient outcomes.

Educational and public health messaging about cannabis was most frequently noticed at dispensaries and on social media. Primary locations for noticing educational materials differed across age groups.



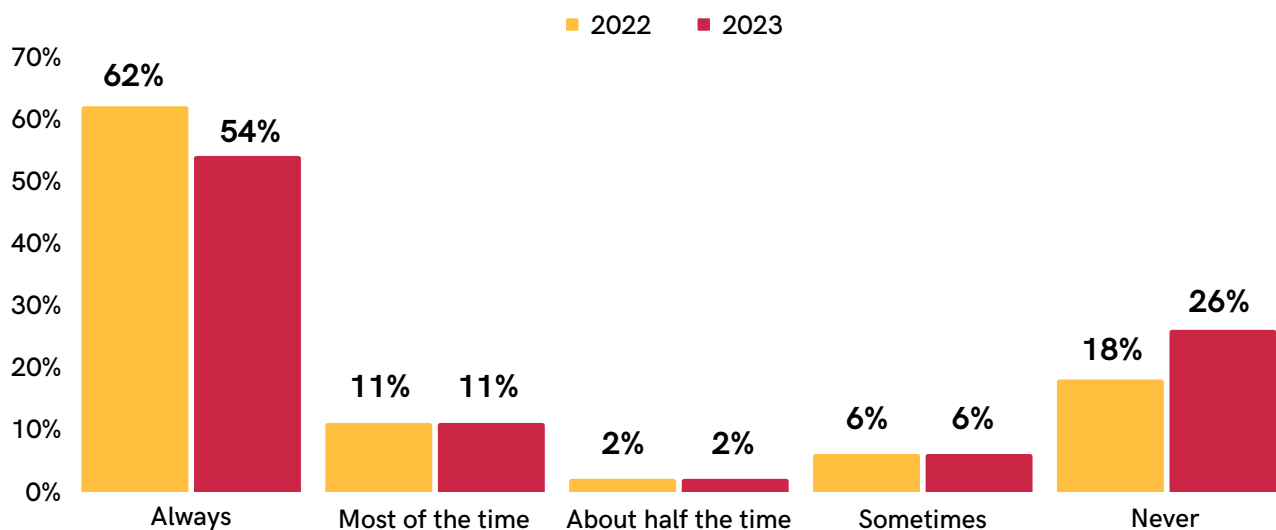


3.1. How many patients keep their cannabis securely locked?

In the 2022 and 2023 surveys, respondents were asked about their use and storage of cannabis in their homes. Patterns of smoking and vaping cannabis inside the home were consistent from 2022 to 2023; participants reporting “never” smoking inside their home remained at 40%, and those reporting “never” vaping inside their home increased by 1% (to 36%) in 2023. However, respondents reported less vigilance about safely storing their cannabis from 2022 to 2023 (see Figure 7). When asked how often they store cannabis in a safe, locked location, respondents reporting “always” decreased from 62% to 54% of the sample, while those reporting “never” increased from 18% to 26% of the sample.

The 2023 responses were then assessed across subgroups based on having children of various age groups in the home and having no children in the home (see Figure 8). Findings show respondents with children of any age in the home report significantly greater frequency of “always” storing cannabis in a safe location and “never” smoking in the home compared to those without children in the home. Frequencies of having children at home and vaping in the home were consistent across all subgroups, suggesting no relationship exists between the two and an opportunity for education about the potential risks of vaping and smoking in the home.

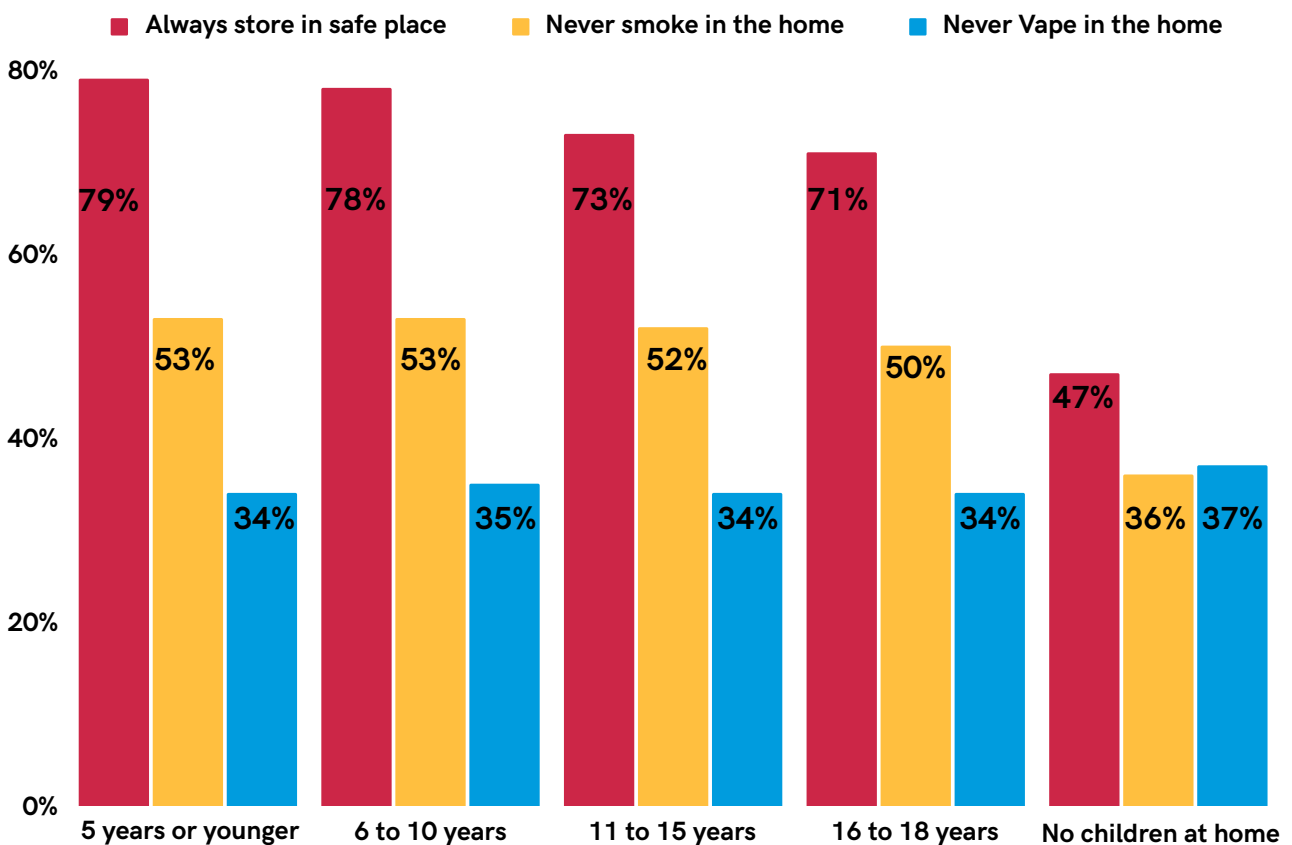
Figure 7. Frequency of Storing Cannabis in a Locked Location, 2022 to 2023





While regulations require tamper-proof/child-proof packaging, patients' own safe-storage practices in the home are important for preventing accidental ingestion of cannabis products, especially among households with young children. Given patients' access to higher potency cannabis products, safe storage is especially important among medical cannabis patients. Continued surveillance of patients' storage practices may be valuable. Additionally, the patient population may benefit from safe-storage efforts to prevent this trend from progressing further; for example, state and local governments around the United States have distributed free locking pouches to consumers to promote safe cannabis storage.¹⁹

Figure 8. Frequency of Safe Storage and Use in the Home, Grouped by Age of Children in the Home, 2023



[19] Cannabis Regulatory Agency. (2023, October 13). 2023 Marihuana Operation and Oversight Grants to Counties: FY 2023 Report to the Legislature. Michigan Department of Licensing and Regulatory Affairs. <https://www.michigan.gov/lara/-/media/Project/Websites/lara/about/Legislative-Reports/Boilerplate-Required-Reports/FY2024/Section-901-Marihuana-Operation-and-Oversight-Grants-Report.pdf?rev=5778f2961d7b49cebe187670fd75d767&hash=18E986EBBC380BA2D9581F96F10F32E2>



3.2. How common is driving under the influence of cannabis (DUIC)?

Patterns and perceptions related to DUIC were measured in the patient samples. Alarming, the percentage of respondents who drove under the influence of cannabis in the past month doubled from 2022 to 2023. Over a third (39%) of the 2023 respondents reported DUIC in the past month, which is a statistically significant increase from 18% in the 2022 survey sample. The frequency of DUIC increased as well, with nearly 16% reporting DUIC six or more times in the past month, an increase from 6% in 2022. The average number of past-month days DUIC also increased from 3.8 in 2022 to 4.2 in 2023. DUIC was associated with younger age, identifying as male, and using cannabis every day and in larger doses.

Studies have reported that 35% to 48%^{20 21} of high-frequency cannabis users drove under the influence of cannabis in the past month, indicating the MMCPs-23 findings may be consistent with national patterns. Regardless, the steep incline in DUIC among Maryland medical cannabis patients is a considerable public health and safety concern; evidence has shown that DUIC significantly increases risk of involvement in a motor vehicle accident.²² One study found greater prevalence of DUIC in states where adult-use cannabis is legal,²³ so the shift in Maryland's cannabis policy between the 2022 and 2023 surveys may have contributed to increased DUIC, but other patient-level factors should also be considered. For example, results from a measure of DUIC risk perception in the 2023 survey suggest respondents may underestimate cannabis's impairment effects, and they may believe that they can control the effects of cannabis enough to drive safely, especially among those who consume high doses of THC. These findings were derived from a question wherein respondents reported the level of cannabis impairment at which they can still drive safely, from 1 (can drive safely at a very low level of impairment) to 10 (can drive safely at a very high level of impairment). Respondents who reported an ability to drive safely at higher levels of impairment also consumed higher average doses of THC, potentially exacerbating the risk of involvement in a motor vehicle accident (see Figure 9).

[20] McGuire, F., Dawe, M., Shield, K. D., Rehm, J., & Fischer, B. (2011). Driving under the influence of cannabis or alcohol in a cohort of high-frequency cannabis users: Prevalence and reflections on current interventions. *Canadian Journal of Criminology and Criminal Justice*, 53(2), 247–259. <https://doi.org/10.3138/cjccj.53.2.247>

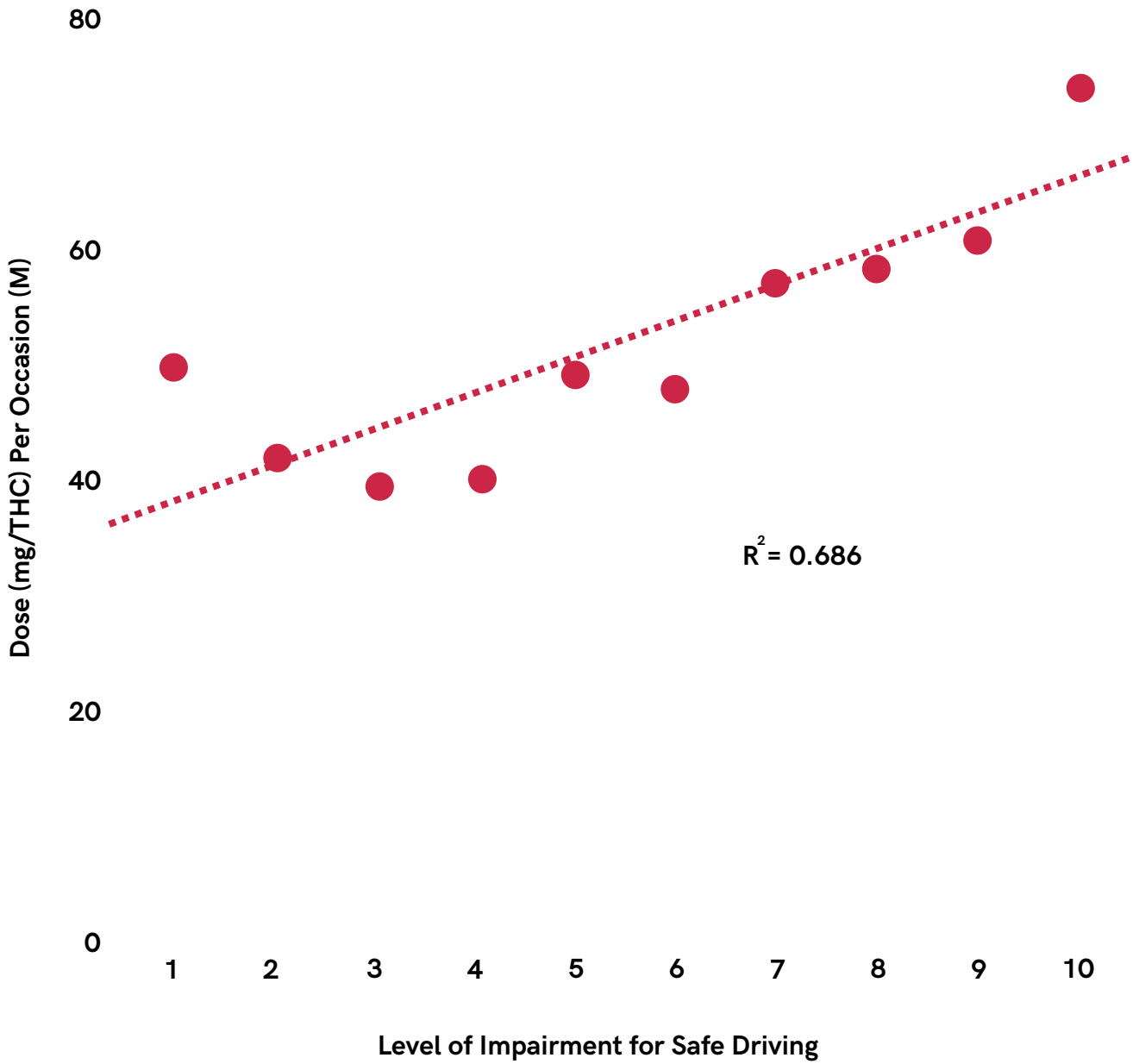
[21] Berg, C. J., Daniel, C. N., Vu, M., Li, J., Martin, K., & Le, L. (2018). Marijuana use and driving under the influence among young adults: A socioecological perspective on risk factors. *Substance Use & Misuse*, 53(3), 370–380. <https://doi.org/10.1080/10826084.2017.1327979>

[22] Hartman, R. L., & Huestis, M. A. (2013). Cannabis effects on driving skills. *Clinical Chemistry*, 59(3), 478–492. <https://doi.org/10.1373/clinchem.2012.194381>

[23] Lensch, T., Sloan, K., Ausmus, J., Pearson, J. L., Clements-Nolle, K., Goodman, S., & Hammond, D. (2020). Cannabis use and driving under the influence: Behaviors and attitudes by state-level legal sale of recreational cannabis. *Preventive Medicine*, 141, 106320. <https://doi.org/10.1016/j.ypmed.2020.106320>



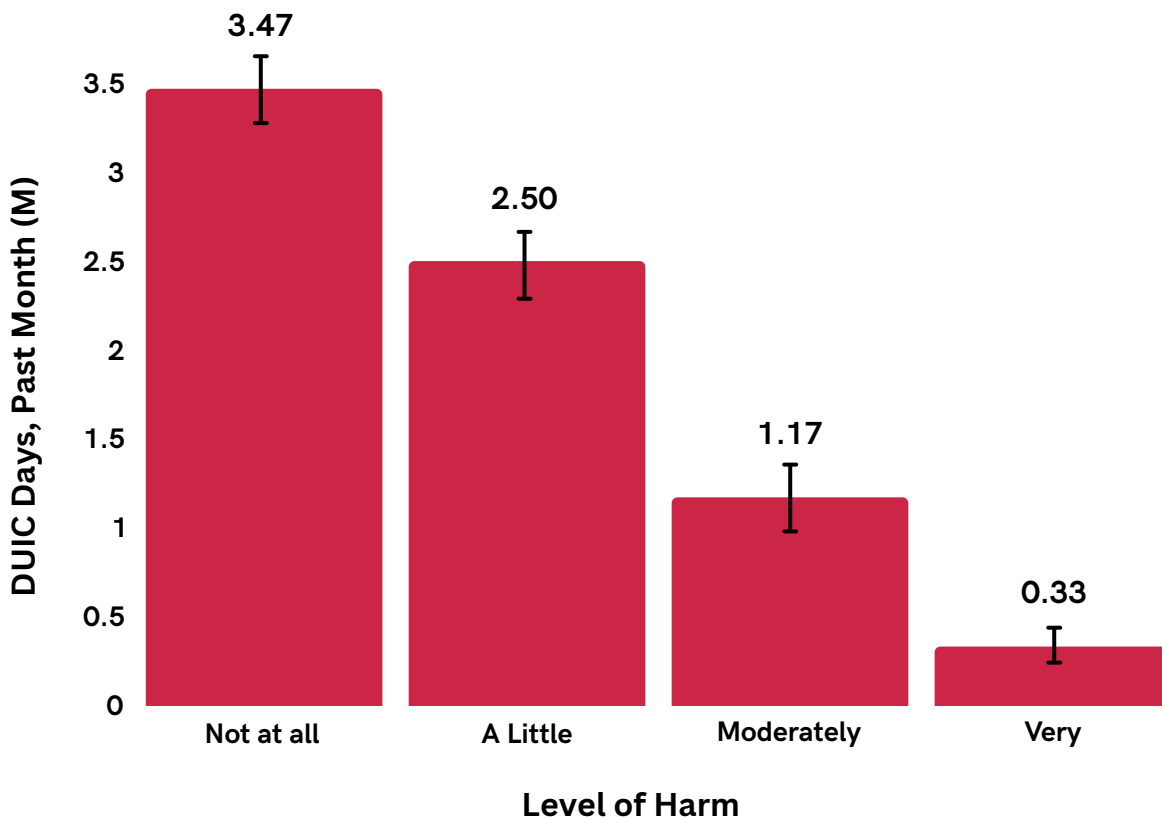
Figure 9. Mean Dose per Occasion by Participants' Perceived Level of Impairment at Which They Can Drive Safely





Moreover, when asked about their perceived risk of harm of driving while impaired (i.e., not at all, a little, moderately, and very harmful), nearly all (98%) respondents said driving under the influence of alcohol is very or moderately harmful, while only 55% of respondents said the same about DUIC. As expected, DUIC was inversely related to perceived risk of harm of DUIC; however, each increasing level of perceived risk of harm contributed to a significant decrease in DUIC days (see Figure 10). This finding is promising for education related to DUIC, because it suggests that shifting perception even one level (e.g., from not at all harmful to a little harmful) may induce fewer days of impaired driving per month. Education that targets perceived risks associated with DUIC is clearly warranted. Unfortunately, the current scientific literature has little evidence of effective strategies for DUIC education.²⁴ Given this gap in the research literature, continued surveillance of DUIC perceptions and patterns following DUIC education activities would provide valuable insights for the public health field.

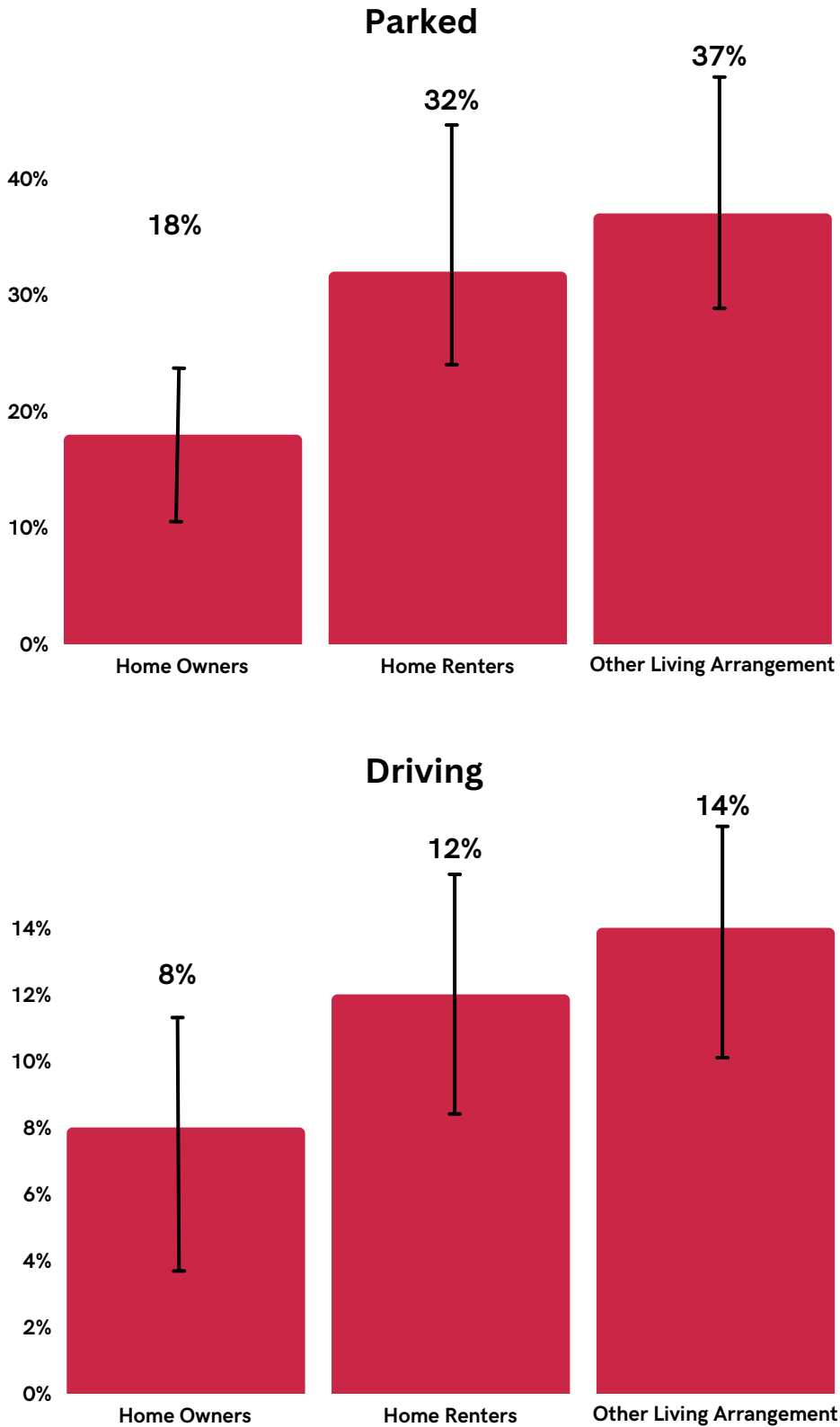
Figure 10. Mean Days of DUIC in the Past Month by Perceived Risk of Harm of DUIC



[24] Colonna, R. (2022). Mass media campaigns and media advocacy related to cannabis-impaired driving: A scoping review. *Journal of Substance Use*, 1–9. <https://doi.org/10.1080/14659891.2022.2120436>



Figure 11. Past Year Cannabis Use in the Car While Parked vs. Driving; Grouped by Home Owners, Renters, or Other



3.3. Where is cannabis used when it is consumed outside the home?

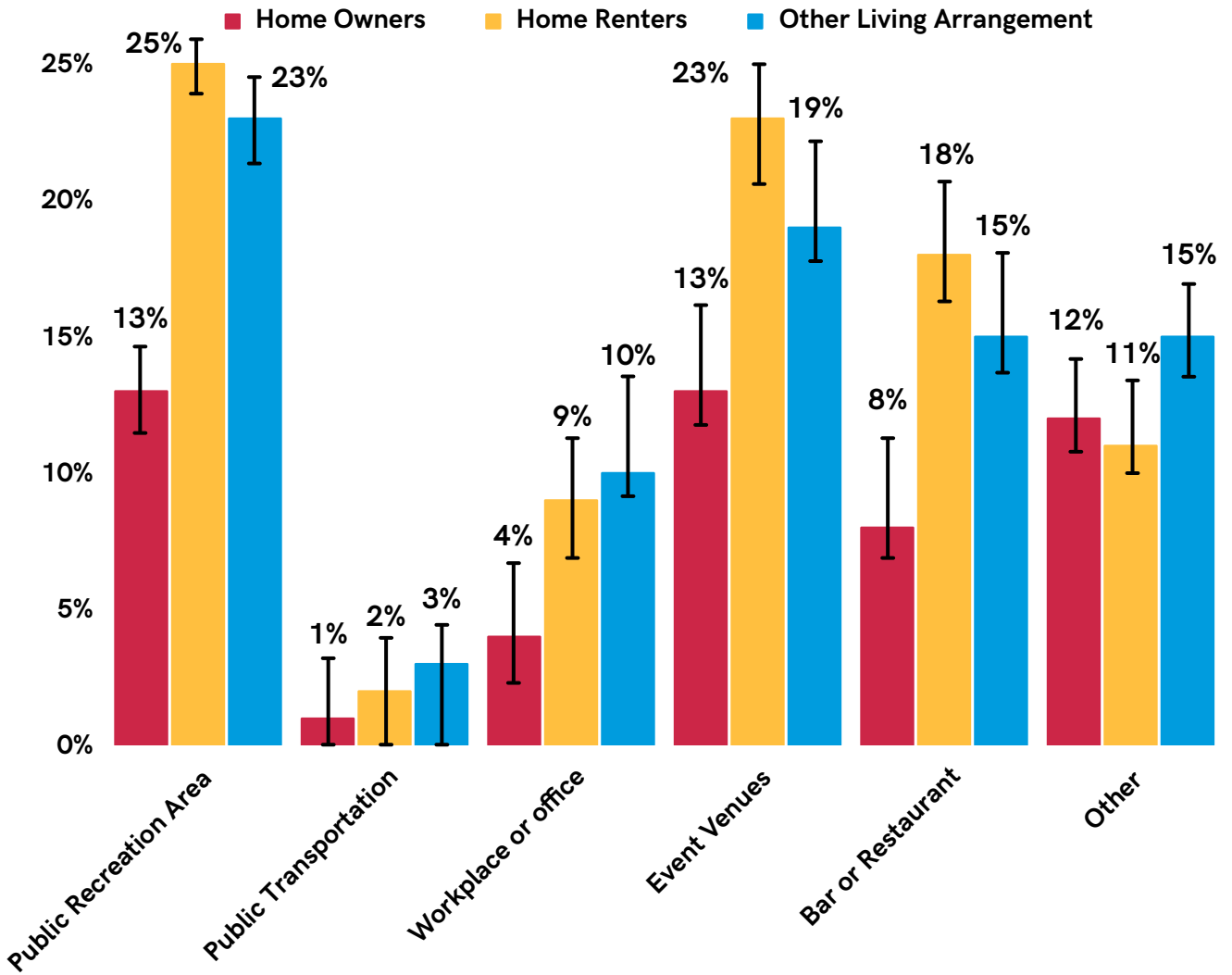
New survey questions were added to the MMCPS-23 to measure the frequency with which respondents smoke or vape in their cars and other public locations. Despite bans on public smoking, 36% of respondents reported smoking or vaping cannabis in one or more public locations in the past month. Public recreation areas (17%) and event venues (16%) were the most common locations for cannabis use outside the home in the past month. Additionally, 24% reported smoking or vaping cannabis in their car while parked, and 10% smoked or vaped in their car while driving in the past year. Smoking or vaping in a parked car was associated with nearly three times greater frequency of DUIC in the prior month, which is a considerable public health and safety risk.

Next, these variables were analyzed by homeownership status; respondents were grouped based on responses to a question that asked whether they owned their home (65%), rented their home (25%), or neither (e.g., staying with a friend, 10%). The following significant differences occurred between the groups: people who either rent or have other living arrangements reported significantly greater frequency of smoking or vaping in a parked car as well as in other public spaces compared to homeowners (see Figures 11 and 12). However, other factors may also influence where respondents choose to smoke or vape. A large proportion (80%) of renters either said their lease did not prohibit smoking or they were unclear of their policy, so rental status alone does not fully account for smoking in public spaces or cars. Importantly, no statistically significant difference in cannabis use while driving was observed based on homeownership (see Figure 11).





Figure 12. Percent of Participants Who Smoked or Vaped Cannabis in Each Location in the Past Month; Grouped by Home Owners, Renters, or Neither





3.4. How prevalent is unwanted cannabis smoke odor and indoor use?

About 10% of respondents report smelling a neighbor's cannabis smoke or vape on a daily basis. Most (70%) reported never or hardly ever smelling a neighbor's cannabis. Of those who rent, 16% said they smoke or vape cannabis inside their rental. A large proportion (24%) of renters were unsure if their lease agreement prohibited indoor cannabis use, suggesting an opportunity for property owners to clearly communicate their policy.

3.5. What insights can be gained on cannabis use in pregnancy?

Less than 1% of respondents from the 2022 and 2023 survey samples indicated that they were currently pregnant and/or breastfeeding at the time of the survey (n = 106 and 125, respectively). Qualifying conditions in the pregnant and/or breastfeeding population were consistent with MMCPS-22. Of the 125 pregnant or breastfeeding respondents from the current study, 75% reported consuming cannabis in the month preceding the survey, which represents a one-third increase from 56% in the 2022 survey. Interestingly, respondents in the full sample (including those not currently pregnant or breastfeeding) ranked wanting education on cannabis use during pregnancy and breastfeeding as a slightly higher priority on the 2023 survey compared to 2022 (median rank 7 vs. 8).

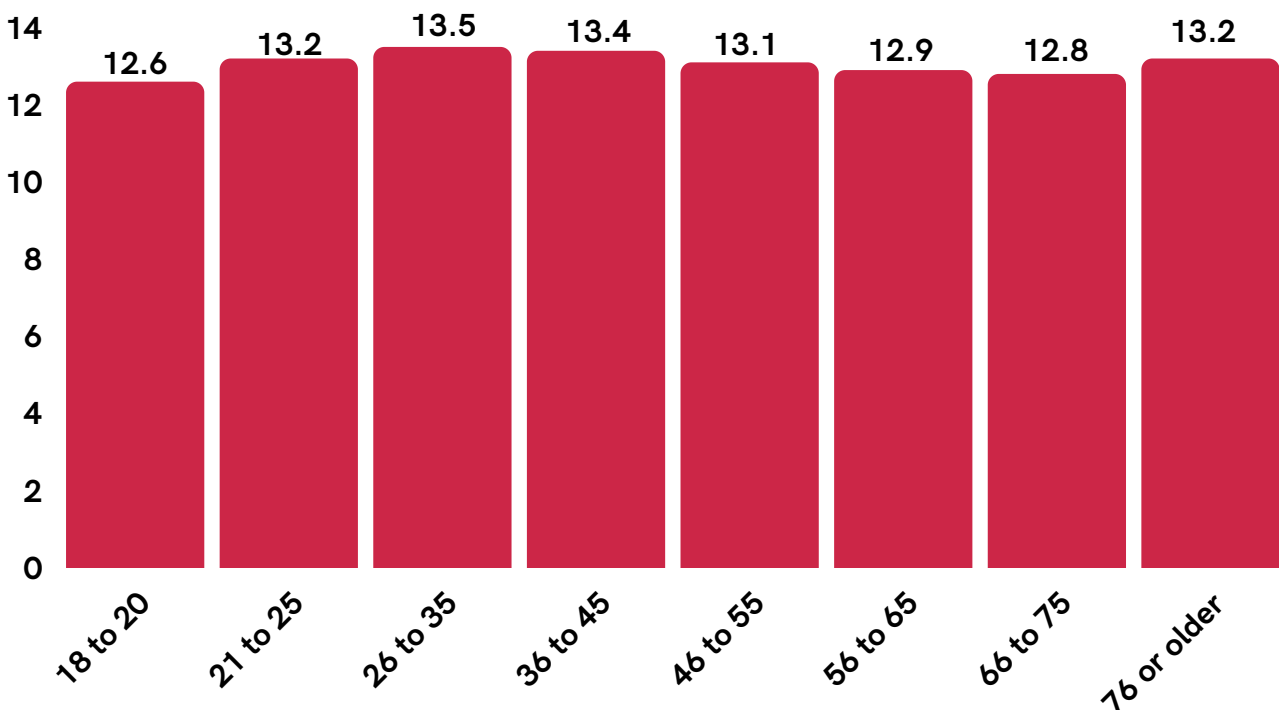
Furthermore, 53% of pregnant and/or breastfeeding respondents reported consuming another substance (i.e., tobacco, alcohol, psychedelics, benzodiazepines, stimulants, opioids) besides cannabis in the past month, compared to 30% in 2022. When asked whether they use cannabis to stop or reduce the use of other substances, 20% (n = 25) indicated doing so for alcohol, and 20% (n = 25) indicated doing so for prescription antidepressant medication. These findings suggest that pregnant and/or breastfeeding respondents may use medical cannabis to discontinue the use of other substances or medications that they may believe to be more harmful than cannabis. Future research with larger sample sizes is needed to better understand this trend. However, given strong recommendations against cannabis use during pregnancy and breastfeeding, patients who are pregnant or might become pregnant may benefit from education on safer alternatives to cannabis in pregnancy as well as evidence-based substance use treatment resources.



3.6. To what extent are respondents experiencing stigma?

Respondents' level of comfort ("very uncomfortable" to "very comfortable") discussing their cannabis use with friends, family, their primary care provider, and other healthcare providers was used as a proxy for measuring perceived stigma in the 2022 and 2023 surveys. Findings were consistent across survey years, suggesting minimal impact of adult-use legalization (or it may be too soon to see a difference). Respondents were most comfortable discussing cannabis with friends (85%) and primary care providers (81%), followed by their family (79%) and other healthcare providers (75%). Figure 13 shows the average total comfort score, which sums responses to the four comfort questions by age groupings. Summed scores of 0 equate to low comfort/high stigma and scores of 16 equal high comfort/low stigma. While total comfort scores are relatively high for all age groups (13.1 on average), comfort is lowest in the 18-to-20-year-old group (12.6 on average), peaks in the 26-to-35-year-old group (13.5 on average) and drops steadily through the 66-to-75-year-old group (12.8 on average). Providers who care for older adults may want to be aware of this greater reluctance to discuss their cannabis use, which may pose health risks, including adverse drug interactions.

Figure 13. Average Summed Scores to Comfort Discussing Cannabis with Friends, Family, PCP, and Healthcare Providers by Age Groups





3.7. What cannabis-related public education is needed?

Respondents' public education priorities were consistent from 2022 to 2023. Among a list of 13 topics, the top 5 topics remained the same, with the addition of educating healthcare providers (new MMCPs-23 question), which became the highest ranked topic (see Table 7). In the 2023 sample, 18.5% of respondents selected “educating healthcare providers about cannabis use” as the most important educational topic, followed by mental health (13.5%) and potency, dosage, and delayed onset of products (8.8%). See Appendix A for a full list of education topics and their rankings.

Table 7. Cannabis-Related Public Education Priorities

	2022	2023
Educating Healthcare Providers	n.d.	18.5%
Mental Health	17.3%	13.5%
Potency, Dosage, Delayed Onset	12.1%	8.8%
Differences between THC and CBD	9.0%	8.7%
Driving	9.9%	8.6%
Legal Issues	10.6%	7.7%

Patients' desire to educate healthcare providers about medical cannabis is not unique to Maryland. Federal policies continue to restrict clinical research studies on cannabis, leaving healthcare providers with limited evidence-based guidance. MCA participated in the development of a training about the clinical uses of cannabis for healthcare providers, which could be promoted to a larger audience of healthcare professionals.²⁵ Supplemental resources for healthcare providers to expand their understanding of medical cannabis use may be warranted. This could include organizing a community of practice to encourage discussion and knowledge-sharing among providers and advocating for cannabis-related education within relevant professional medical organizations.

[25] This provider education program includes a modest fee. Information is available at [Maryland Provider Education: Medical Use of Cannabis v3.0 - TMCI Global \(themedicalcannabisinstitute.org\)](https://www.themedicalcannabisinstitute.org).



Additionally, since nearly all respondents (93%) reported seeking information from dispensaries, promoting the use of Clinical Directors, who are available at all licensed dispensaries during business hours and are required to complete annual clinical training on uses of cannabis, could prove beneficial.

Because “mental health” was the top education priority in the 2022 survey, a follow-up question was added in 2023 to further explore what type of mental health education patients wanted. Respondents who ranked mental health among the top three topics received a follow-up question, which asked them to rank six mental-health-related topics by order of importance (see Table 8). “How cannabis helps mental health conditions” was ranked first by 22.1% of the sample. “Selecting medical cannabis products for specific conditions” and “How to use cannabis safely when you have a mental health condition” were each ranked as a distant second and third by approximately 4% of respondents each. This question was framed to help clarify patients’ motivations and needs; however, it is important to note that cannabis use does not always help or improve mental health conditions. In fact, research tends to show that cannabis may be harmful, rather than helpful, for mental health conditions. In the existing literature, cannabis use is consistently associated with increased risks of depression and anxiety symptoms.²⁶ This is particularly prevalent among people who have a greater frequency of use and/or earlier age of onset of use.^{27 28} However, additional research is needed to further elucidate the relationship between cannabis consumption and mental health.

Table 8. Percentage of Sample That Ranked Each Mental Health Education Topic as Most Important*

	2023
How cannabis helps mental health conditions	22.1%
Selecting medical cannabis products for specific conditions	4.2%
How to use cannabis safely when you have a mental health condition	3.6%
How cannabis interacts with mental health perscriptions	1.5%
How cannabis harms mental health conditions	1.3%
Other	0.2%

*Patients should always consult a physician to manage mental health conditions.

[26] Halladay, J. E., MacKillop, J., Munn, C., Jack, S. M., & Georgiades, K. (2020). Cannabis use as a risk factor for depression, anxiety, and suicidality: Epidemiological associations and implications for nurses. *Journal of Addictions Nursing*, 31(2), 92–101. <https://doi.org/10.1097/JAN.0000000000000334>

[27] Hengartner, M. P., Angst, J., Ajdacic-Gross, V., & Rössler, W. (2020). Cannabis use during adolescence and the occurrence of depression, suicidality and anxiety disorder across adulthood: Findings from a longitudinal cohort study over 30 years. *Journal of affective disorders*, 272, 98–103. <http://dx.doi.org/10.1016/j.jad.2020.03.126>

[28] Turna, J., Simpson, W., Patterson, B., Lucas, P., & Van Ameringen, M. (2019). Cannabis use behaviors and prevalence of anxiety and depressive symptoms in a cohort of Canadian medicinal cannabis users. *Journal of Psychiatric Research*, 111, 134–139. <https://doi.org/10.1016/j.jpsychires.2019.01.024>



The 2023 survey aimed to understand where public health messaging about cannabis is most frequently observed and by whom. Respondents were asked whether they had seen educational campaigns or public health messages about cannabis in several types of locations. (See Appendix A for the full list of locations and frequency with which they were observed by respondents.) Most (77%) respondents noticed cannabis educational messages in at least one location, while three locations was the average. Dispensaries were the most common location, reported by nearly two-thirds (63%) of respondents. The other common locations among the full sample were social media (37%), websites (34%), TV or radio (29%), billboards or posters (28%), and email or text messages (21%). See Table 9 for the first and second most common locations in which each age group observed cannabis educational materials or messaging. Interestingly, seeing educational materials in more locations produced low-strength correlations with several cannabis-related harms, including CUD, DUIC, and consuming high doses of THC ($r_s = .11$ to $.18$, $p_s < .001$). Of note, the educational source (e.g., dispensary, pharmacy/healthcare service) was not assessed. To understand these relationships, future research is needed that more closely examines patients' awareness and acceptance of cannabis educational materials.

Table 9. Locations Where Cannabis Education Materials Were Most Frequently Noticed, by Age Group

Age Groups	Primary Location	Secondary Location
18 to 20	School	Movies
21 to 25	Gas Stations	At their workplace
26 to 35	Gas stations	Public Events
36 to 45	Gas Stations	Flyers or Poster Mail
46 to 55	Flyers or Postal Mail	Bars, pubs, nightclubs
56 to 65	Email or text	Dispensaries
66 or older	Print newspapers or magazines	Email or Text



3.8. How prevalent is problem cannabis use?

The Cannabis Use Disorder Identification Test (CUDIT) and its abbreviated versions (CUDIT-Revised and CUDIT-Short Form) are widely used screening instruments for identifying CUD as defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Screening for problem cannabis use is becoming more common in clinical settings and public health surveillance programs due to the increasing prevalence of cannabis use and emerging research about cannabis dependence. However, while the CUDIT has been widely used to study CUD in nonmedical cannabis, fewer studies have focused specifically on medical patient populations. Some research suggests that population-specific cutoff values may be needed when using the CUDIT to account for differing use characteristics, such as with medical cannabis populations.^{29 30} Despite unanswered questions that remain in the research literature about the suitability of the CUDIT for medical cannabis patients, the MMCPs-23 included the CUDIT-Short Form (CUDIT-SF)³¹ to collect important baseline data about problem use in the medical patient population.

In the MMCPs-23, the CUDIT-SF asked respondents three questions about the frequency with which they have experienced adverse side effects or outcomes related to cannabis use in the past 6 months. Likert scale response options ranged from 0 (never) to 3 (daily), and summed scores of 2 or higher met the criteria for CUD, per the standard CUDIT-SF cut-score. Approximately 33% of the sample met the criteria for CUD, and among those, the majority were 46–55 years old (23.3%) and female (56.2%); they used cannabis 24 days per month, on average, and approximately 15% of their total cannabis use was for nonmedical reasons (see Table 10).

The MMCPs-23 CUD findings are consistent with those from other studies. For example, one recent study found that CUD prevalence in medical cannabis patients ranged from 28% to 51%.³² Interestingly, the researchers found that using cannabis for both medical and nonmedical purposes was associated with greater prevalence of CUD, compared to medical use only, which was also replicated in the current study (Table 10).

[29] Myers, et al. (2023). Assessing the diagnostic utility of the Cannabis Use Disorder Identification Test – Revised (CUDIT-R) among veterans with medical and non-medical cannabis use. *Drug and Alcohol Dependence*, 247, 109876. <https://doi.org/10.1016/j.drugalcdep.2023.109876>

[30] Arkell, T. R., Manning, B., Downey, L. A., & Hayley, A. C. (2023). A semi-naturalistic, open-label trial examining the effect of prescribed medical cannabis on neurocognitive performance. *CNS Drugs*, 37(11), 981–992. <https://doi.org/10.1007/s40263-023-01046-z>

[31] Bonn-Miller, M. O., Heinz, A. J., Smith, E. V., Bruno, R., & Adamson, S. (2016). Preliminary development of a brief cannabis use disorder screening tool: The Cannabis Use Disorder Identification Test Short-Form. *Cannabis and Cannabinoid Research*, 1(1), 252–261. <https://doi.org/10.1089/can.2016.0022>

[32] Gendy, M. N. S., Taisir, R., Sousa, S., Costello, J., Rush, B., Busse, J. W., & Mackillop, J. (2023). Prevalence of cannabis use disorder among individuals using medical cannabis at admission to inpatient treatment for substance use disorders. *Addictive Behaviors*, 142, 107667. <https://doi.org/10.1016/j.addbeh.2023.107667>



Since a modified version of the CUDIT-SF was included in the MMCPs-22, this limited the ability to estimate CUD in 2022 and compare across years; however, about twice as many respondents in 2023 indicated they spent “a great deal of time obtaining, using or recovering from cannabis use.”

Respondents were also asked to report their desire to reduce their cannabis consumption on a scale of 1 (not interested at all) to 10 (very interested). Overall, the sample showed little desire to cut back their cannabis use, as 67% selected “not interested at all.” Those who met the criteria for CUD indicated their interest at a score of 2.4, on average, which is double the score of those who did not meet the criteria for CUD (1.2, on average). Support for a state-funded cannabis quit line was also associated with a higher CUD score. Patients may benefit from increased availability of information on the risks associated with CUD and how to obtain assistance if they experience cannabis-related mental or physical health problems. Continued CUD surveillance would be valuable for reducing patient harms, and MCA should monitor emerging research on the most effective ways to assess problem use in medical cannabis patients.

Table 10. Characteristics of Those Who Did and Did Not Meet the Criteria for CUD

Met Criteria for CUD	Cannabis Use days/month (m)*	Alcohol Use days/month (m)*	mg/ THC dose (m)*	DUIC dose (m)*	Interest in reducing cannabis use: 1 (none) to 10 (very)*	%of total cannabis use that is for nonmedical reasons (m)*
Yes	23.8	4.5	63.6	2.1	2.4	15%
No	21.3	4.9	52.6	1.4	1.2	10%

* Statistically significant at p = .05
(m) = mean or average

Section 4. Program Interactions

Key findings



Patient engagement and satisfaction with the medical cannabis program improved across several measures in 2023, and participation in the program is anticipated to continue despite the recent launch of the adult-use market.

Adding to their overall satisfaction of the medical program now that adult-use is legal, respondents' confidence that dispensary products are safe and uncontaminated increased slightly.



Dispensaries were the most common source for obtaining information about cannabis.

The survey measured the frequency with which respondents use medical-only features at dispensaries, with access to medical-only products and medical-only hours or lines each used regularly by at least half of the sample. Delivery services were used infrequently.



The most valued factors of the medical cannabis program were the same for 2022 and 2023 respondents: wider availability of cannabis products and strains, tax-free purchases, and access to higher potency products.



4.1. How has participation in the medical program changed since legalization?

The survey results from 2022 to 2023 suggest continued public interest and engagement with the medical program despite adult-use legalization. Nearly one-fifth (18%) of respondents became certified medical cannabis patients within the past year. Furthermore, only 1.8% of survey participants communicated their intent to leave the medical program when their certification expires. This represents a significant decrease from 2022, when 8.7% of respondents indicated intent to leave the medical program if adult-use was legalized. (The 2022 survey was conducted shortly before the ballot referendum to legalize adult-use.) Together, findings suggest patients have an initial level of satisfaction with the medical program at the start of expanded legalization.

Table 11. Rank Order of the Respondents' Most Important Factor That Keeps Them in the Medical Cannabis Program

	n	%
Wider Availability of Products and Strains	5,626	34.2%
Tax Benefit	3,098	18.8%
High Potency of Products	2,057	12.5%
Stronger Legal Protections	1,827	11.1%
Patient Only Line or Hours	1,694	10.3%
Education (Clinical Directors)	565	3.4%
Other	550	3.3%
Higher possession/ purchase limits	267	1.6%
Access to delivery service	268	1.6%
Lower Age Restrictions	77	0.5%



Consistent across both years of the survey, participants placed high value on the medical program’s wider availability of cannabis products and strains, tax exemption on products for patients, and access to higher potency products (see Table 11 for the rank order of these and other factors). Interestingly, “Higher possession/purchase limits” was ranked toward the bottom of the list, suggesting that the current possession limits defined by HB-556³³ likely satisfy patients’ needs. “Access to delivery services” also ranked near the bottom.

4.2. How have patient experiences changed with legalization?

In the MMCPS-23, respondents were asked whether they had observed changes to the price and supply of their preferred medical cannabis products since implementation of the adult-use market. Two-thirds (67%) of respondents reported that the supply of their preferred products had either improved (i.e., access increased) or had not changed. Similarly, 60% said the prices of their preferred products either improved (i.e., prices became more affordable) or had not changed. The price finding is corroborated by the decrease in the average amount spent per purchase from 2022 to 2023 (see Section 2.4). The responses to these questions were then grouped and analyzed within counties to gain insights into areas that may be affected by supply shortages and/or price increases. Within each county, the largest percentage of respondents who said supply had worsened were from Allegany and Cecil Counties (52% and 48%, respectively), and the largest percentage of respondents who said prices had worsened were from Cecil and Carroll Counties (55% and 47%, respectively). Among all respondents, reporting that the supply and/or price of medical cannabis had worsened was associated with higher risk behaviors in other areas of the survey. For example, those reporting worsened supply and/or price drove under the influence of cannabis more often, spent more per purchase, and consumed cannabis more frequently and in larger doses, on average. They also tended to be younger (36 to 45 years old) compared to those who reported improvements or no effect (46 to 55 years old), on average.

The proportion of respondents who have “very high confidence” that the cannabis they purchase from dispensaries is safe and uncontaminated increased slightly from 79% in 2022 to 81% in 2023. It is encouraging that trust in cannabis product safety continues to move in a positive direction with the expanded marketplace.

[33] HB-556 set qualifying patients’ possession limits at 120 grams of flower and 36 grams of cannabis-infused products.



It also suggests an opportunity to educate adult-use consumers about the benefits of purchasing cannabis from licensed dispensaries. Of the dispensary features that are currently available only to medical patients, medical-only products and patient-only lines or hours were used the most frequently; 57% and 50%, respectively, reported using them “all the time.” In contrast, less than 10% of respondents used curbside or drive-through services “all of the time,” and less than 5% used delivery services “all of the time.” Continued measurement of dispensary services for medical cannabis patients is warranted to ensure their needs are prioritized.

4.3. Where do patients get their information?

Understanding the sources patients use to gain information about cannabis can inform MCA’s programmatic developments, such as how to increase the likelihood of reaching patients with educational materials. A series of sources were presented in the survey, and respondents reported whether they obtained information about cannabis from each. Nearly all (93%) respondents obtained information from dispensaries, and half (49%) obtained information from their certifying provider. Family or friends (45%) were also common sources of information, as well as Clinical Directors (34%). Sourcing information from websites (23%) and social media platforms (10%) also increased. One in five (20%) reported receiving information from primary care providers (added in MMCPS-23). Respondents could also specify the websites that they use for information in a text field; Leafly, Weedmaps, and dispensary websites were most common.

4.4. How frequently are Clinical Directors used?

Use of Clinical Directors was consistent from 2022 to 2023, including the percentage of participants who reported ever meeting with a Clinical Director in person (42% vs. 41%, respectively) or virtually (49% vs 50%, respectively). Overall awareness was unchanged, with 30% of both years’ survey samples reporting they were not aware of the medical program’s Clinical Directors. Promotion of Clinical Director services, particularly to newly certified medical cannabis patients, is warranted.

Section 5.

Key Insights and Recommendations

5.1. Summary

The MMCPS study findings show that medical cannabis patients in Maryland have maintained their dedication to the medical program, even with the opening of the adult-use market. Patients are highly active, they reported high satisfaction across many survey measures, and most intend to stay in the medical program by renewing their certification, despite access to the adult-use market. These are valuable strengths that should be leveraged in MCA's future efforts to improve the medical cannabis program and patient outcomes. With those strengths in mind, this section summarizes key findings that have the potential for harm and thus should be prioritized in future programmatic efforts. Recommendations for evidence-based prevention and intervention approaches are discussed.

5.2. The primary problem: High-risk behaviors and harmful outcomes increased

Results from the MMCPS indicate a worsening of several negative cannabis-related outcomes among patients. First, there were steep increases in DUIC from 2022 to 2023. Cannabis use while pregnant or breastfeeding also increased from 2022 to 2023, and further monitoring of cannabis use while pregnant or breastfeeding is warranted. Additionally, patients may be consuming cannabis in doses that are higher than necessary for medical benefits. Other noteworthy outcomes that were observed in 2023 but not measured in 2022 included a substantial proportion of respondents meeting criteria for CUD (33%) as well as many being at high risk for polysubstance use, with 44% of respondents using cannabis to alter their use of other substances, particularly alcohol. Importantly, the increases in adverse outcomes and high-risk behaviors cannot be attributed to increased cannabis consumption, because consumption patterns (past-month frequency, method, dose) were mostly consistent from 2022 to 2023. Other factors, such as risk perceptions, may be contributing to the increases in harmful outcomes.



5.3. A potentially contributing trend: Perceptions of risk declined

Several findings from the MMCPs study suggest that patients' perceptions of risk related to cannabis use are declining. In summary, 1) fewer respondents reported storing their cannabis in a safe, locked location in their homes; 2) more respondents who were pregnant or breastfeeding reported past-month cannabis use, suggesting perceived risks of use in pregnancy or breastfeeding may be declining; 3) many respondents perceived cannabis to be beneficial for treating mental health conditions, while few were considering the potential for harm to mental health. This is concerning, as research has shown that cannabis can produce adverse effects on mental health and it is unknown whether respondents are under the care of a healthcare provider.³⁴

Notably, while perceived efficacy is not a risk on its own, respondents reported an increase in the perceived efficacy of medical cannabis for treating their conditions in 2023 compared to 2022. This finding is unexpected, given that there were very few changes in the variables that measured how and why patients were using medical cannabis. The change in perceived efficacy may be explained, in part, by the public's attitudes about cannabis shifting, viewing it as more beneficial and less risky overall.

5.4. Recommendation for next steps: Address risk perceptions with a tiered-intervention approach

An established theory in social science and health research maintains that risk perceptions are a determining factor of health behavior.³⁴ An individual's risk perceptions can be low (i.e., optimistic) or high (i.e., pessimistic) about a given risk, and the accuracy of their perceptions can have important consequences for related health outcomes. While many factors contribute to the development of risk perceptions, they are often influenced by the prominence and availability of information about the risk. The MMCPs offered evidence for the theory that risk perceptions are correlated with health outcomes.

[34] Hall, W., Hoch, E., & Lorenzetti, V. (2019). Cannabis use and mental health: Risks and benefits. *European Archives of Psychiatry and Clinical Neuroscience*, 269(1), 1–3. <https://doi.org/10.1007/s00406-019-00986-2>



As previously described, the MMCPs study showed cannabis perceptions trending toward lower risk/higher benefit, and at the same time, adverse health behavior outcomes increased (e.g., rate of DUIC doubled). Fortunately, a considerable body of research has demonstrated that changing risk perceptions can be an effective approach for motivating positive behavior change.³⁵ Building on the scientific literature and the current MMCPs research, we recommend addressing cannabis risk perceptions using a two-tiered approach that incorporates prevention and treatment activities. Tier one is prevention focused and involves an evidence-based educational messaging campaign informed by input from the patient population. Tier two is treatment focused and offers an individual-level resource for high-risk patients.

Tier 1. Establish an evidence base for informed public educational messaging campaigns.

Messaging campaigns are an accessible approach for addressing risk perceptions and generating population health behavior change. However, due to limitations in funding and the availability of relevant research, they are rarely developed on an empirical evidence base,³⁶ which can limit their reach and efficacy. Knowing these common challenges, we recommend conducting research to inform the direction and content of the messaging and education campaigns. Given the successful completion of the two-year MMCPs study, which was met with enthusiasm from the patient population, MCA is currently in a unique position to conduct novel research about cannabis messaging. Much like the current MMCPs study, MCA could invite patients to complete a brief survey or participate in focus groups in which they view trial educational materials and then respond to survey items that measure their reactions to those materials. Evaluating patients' interest, acceptance, trust, and perceptions during the early stage of campaign development would provide MCA with a strong direction and evidence base for developing effective public health messaging.

[35] Ferrer, R. A., & Klein, W. M. (2015). Risk perceptions and health behavior. *Current Opinion in Psychology*, 5, 85–89. <https://doi.org/10.1016/j.copsyc.2015.03.012>

[36] Roundtable on Population Health Improvement. Board on Population Health and Public Health Practice, & Institute of Medicine. (2015, December 2). *Communicating to advance the public's health: Workshop summary*. National Academies Press (US). <https://doi.org/10.17226/21694>



Tier 2. Use a brief digital intervention for high-risk populations.

In addition to general educational campaigns, MCA should consider a targeted approach to helping high-risk patients by using digital interventions. Typically accessed from a smartphone, tablet, or computer, digital interventions are brief activities that are precisely designed to improve mental and behavioral health outcomes. A variety of brief digital interventions are available that have shown notable changes to risk perceptions and health behavior in past studies. One study on a digital intervention for problematic cannabis use demonstrated that one 15-minute session noticeably decreased cannabis use in grams and number of uses per day and improved decision-making.³⁷ Knowing that one-third of MMCPs-23 respondents met the criteria for CUD, and one-quarter of respondents supported the idea of a cannabis helpline that assists patients in reducing their cannabis use, a brief digital intervention would be a valuable resource for patients who need, or wish, to cut down their daily cannabis use.

Conclusion

With participation from more than 30,000 medical patients, the two-timepoint, pre/post-legalization design of the MMCPs is novel and offers a wealth of data and insights about the uses, perceptions, and health outcomes of the medical patient population. Future programmatic efforts that combine prevention and treatment frameworks are necessary for balancing harmful risk perceptions and a rise in negative outcomes.

[37] Sofis, M. J., Lemley, S. M., Lee, D. C., & Budney, A. J. (2020). A web-based episodic specificity and future thinking session modulates delay discounting in cannabis users. *Psychology of Addictive Behaviors, 34*(4), 532–540. <https://doi.org/10.1037/adb0000557>

Appendix A.

Table A1. Descriptive Statistics: survey questions and frequency distributions, including 2022 responses when applicable

	2022		2023	
	n	%	n	%
How old are you?				
18 to 20	206	1.6%	191	1.2%
21 to 25	676	5.2%	578	3.5%
26 to 35	2674	20.6%	2576	15.7%
36 to 45	3140	24.1%	3541	21.5%
46 to 55	2245	17.3%	2879	17.5%
56 to 65	2207	17.0%	3313	20.1%
66 to 75	1665	12.8%	2906	17.7%
76 to 85	181	1.4%	437	2.7%
86+	16	0.1%	26	0.2%
What is your gender identity?				
Female	6994	53.8%	9327	56.7%
Male	5684	43.7%	6696	40.7%
Non-binary	161	1.2%	204	1.2%
Transgender female	25	0.2%	27	0.2%
Transgender male	35	0.3%	41	0.2%
Not included above	12	0.1%	9	0.1%
Prefer not to answer	100	0.8%	142	0.9%
Please choose the option below that is most accurate for you.				
I am currently breastfeeding	34	0.3%	35	0.2%
I am currently pregnant	62	0.5%	56	0.3%
I am currently pregnant and breastfeeding	10	0.1%	34	0.2%
I am not currently, but was pregnant or breastfeeding in the last year	184	1.4%	251	1.5%
I am neither pregnant nor breastfeeding	6857	52.7%	9122	55.5%
I prefer not to answer	151	1.2%	205	1.2%
Does anyone under the age of 18 live with you?				
No one under 18 lives with me	9440	72.6%	12087	73.5%
Yes, one or more children under age 5	1391	10.7%	1402	8.5%
Yes, one or more children ages 6-10	1629	12.5%	1588	9.7%
Yes, one or more children ages 11-15	1569	12.1%	1774	10.8%

Yes, one or more children ages 16-17	818	6.3%	1094	6.7%
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What is your race?

American Indian or Alaska Native	69	0.5%	317	0.6%
Asian	153	1.2%	315	1.2%
Black or African American	1778	13.7%	2964	16.1%
Native Hawaiian or Other Pacific Islander	19	0.1%	73	0.2%
White or Caucasian	10181	78.2%	12890	75.5%
Other, not included above	376	2.9%	523	2.8%
Two or more races	435	3.3%	568	3.5%

Are you Hispanic or Latino?

Yes	813	6.2%	887	5.4%
No	12185	93.7%	15543	94.5%

What is the highest level of schooling you have completed?

Bachelor's degree	3241	24.9%	3849	23.4%
High school diploma or equivalent	2159	16.6%	2854	17.4%
Less than high school	165	1.3%	212	1.3%
Master's degree, PhD, or other postgraduate education	2524	19.4%	3170	19.3%
Some college, or associates degree	4177	32.1%	5387	32.8%
Trade school certificate/diploma	743	5.7%	972	5.9%

Do you currently have health insurance?

Yes	-	-	15717	95.6%
No	-	-	727	4.4%

Which statement best describes your current employment status?

Not working	689	5.3%	999	6.1%
Not working, seeking employment	370	2.8%	551	3.3%
Retired	2350	18.1%	4184	25.4%
Stay-at-home parent or homemaker	594	4.6%	659	4.0%
Student	234	1.8%	300	1.8%
Working full-time	7285	56.0%	8213	49.9%
Working part-time	1078	8.3%	1536	9.3%

What is your annual household income from all sources?

No income	222	1.7%	271	1.6%
Less than \$14,000	567	4.4%	693	4.2%
\$14,000 to \$29,999	1086	8.3%	1364	8.3%
\$30,000 - \$49,999	1786	13.7%	2176	13.2%
\$50,000 - \$74,999	2000	15.4%	2516	15.3%
\$75,000 - \$99,999	1612	12.4%	2042	12.4%

\$100,000 to \$149,999	2176	16.7%	2660	16.2%
\$150,000 - \$199,999	1099	8.4%	1491	9.1%
\$200,000 or more	987	7.6%	1226	7.5%
I prefer not to answer	1227	9.4%	1695	10.3%

In which county in Maryland do you reside?

Allegany County	198	1.5%	258	1.6%
Anne Arundel County	1481	11.4%	1862	11.3%
Baltimore City	1203	9.2%	1412	8.6%
Baltimore County	2304	17.7%	2833	17.2%
Calvert County	240	1.8%	325	2.0%
Caroline County	109	0.8%	134	0.8%
Carroll County	532	4.1%	713	4.3%
Cecil County	280	2.2%	413	2.5%
Charles County	244	1.9%	356	2.2%
Dorchester County	114	0.9%	156	0.9%
Frederick County	801	6.2%	1003	6.1%
Garrett County	60	0.5%	71	0.4%
Harford County	809	6.2%	980	6.0%
Howard County	702	5.4%	860	5.2%
Kent County	42	0.3%	71	0.4%
Montgomery County	1654	12.7%	1992	12.1%
Prince George's County	742	5.7%	1018	6.2%
Queen Anne's County	166	1.3%	219	1.3%
Somerset County	218	1.7%	64	0.4%
St. Mary's County	46	0.4%	272	1.7%
Talbot County	114	0.9%	183	1.1%
Washington County	391	3.0%	501	3.0%
Wicomico County	328	2.5%	413	2.5%
Worcester County	213	1.6%	323	2.0%
Other	11	0.1%	13	0.1%

Have you ever served in the Armed Forces, in the Reserves, or in the National Guard?

Yes	1168	9.0%	1602	9.7%
No	11760	90.4%	14724	89.5%
Prefer not to answer	82	0.6%	118	0.7%

	2022		2023	
	n	%	n	%
How many days in the past month did you use each substance?				
Cannabis				
0 days	521	4.0%	498	3.0%
1-4 days	1134	8.7%	1322	8.0%
5-10 days	1216	9.3%	1411	8.6%
11-19 days	1652	12.7%	1877	11.4%
20-29 days	2602	20.0%	3335	20.3%
All 30 days	5866	45.1%	7970	48.5%
Tobacco				
0 days	10095	77.6%	12710	77.3%
1-4 days	430	3.3%	552	3.4%
5-10 days	231	1.8%	286	1.7%
11-19 days	233	1.8%	234	1.4%
20-29 days	252	1.9%	322	2.0%
All 30 days	1693	13.0%	2155	13.1%
Alcohol				
0 days	5207	40.0%	7005	42.6%
1-4 days	3784	29.1%	4570	27.8%
5-10 days	1975	15.2%	2229	13.6%
11-19 days	1168	9.0%	1370	8.3%
20-29 days	569	4.4%	769	4.7%
All 30 days	259	2.0%	364	2.2%
Psychedelics				
0 days	12453	95.7%	15597	94.8%
1-4 days	409	3.1%	540	3.3%
5-10 days	30	0.2%	53	0.3%
11-19 days	10	0.1%	13	0.1%
20-29 days	3	0.0%	9	0.1%
All 30 days	27	0.2%	26	0.2%
Benzodiazepines				
0 days	11774	90.5%	14897	90.6%
1-4 days	526	4.0%	608	3.7%

5-10 days	176	1.4%	168	1.0%
11-19 days	77	0.6%	94	0.6%
20-29 days	66	0.5%	75	0.5%
All 30 days	313	2.4%	392	2.4%
Stimulants				
0 days	12178	93.6%	15327	93.2%
1-4 days	168	1.3%	181	1.1%
5-10 days	85	0.7%	81	0.5%
11-19 days	74	0.6%	89	0.5%
20-29 days	130	1.0%	147	0.9%
All 30 days	295	2.3%	392	2.4%
Opioids				
0 days	12306	94.6%	15287	92.9%
1-4 days	175	1.3%	242	1.5%
5-10 days	67	0.5%	91	0.6%
11-19 days	48	0.4%	84	0.5%
20-29 days	42	0.3%	82	0.5%
All 30 days	284	2.2%	442	2.7%

How many years have you been a certified patient in the Maryland medical cannabis program?

1 year	3721	28.6%	3027	18.4%
2 years	3397	26.1%	3239	19.7%
3 years	3233	24.8%	4431	26.9%
4 years	1630	12.5%	2592	15.8%
5 years	893	6.9%	1743	10.6%
6 years	-	-	1236	7.5%

In the past year, how often did you engage in each of the following?

I smoked cannabis inside my house

Always	5145	39.5%	3880	23.6%
Most of the time	2969	22.8%	2526	15.4%
About half the time	1994	15.3%	612	3.7%
Sometimes	589	4.5%	2754	16.7%
Never	2260	17.4%	6625	40.3%

I vaped cannabis inside my house

Always	2340	18.0%	2961	18.0%
Most of the time	1966	15.1%	2327	14.1%
About half the time	835	6.4%	925	5.6%
Sometimes	3310	25.4%	4228	25.7%

Never	4514	34.17%	5939	36.1%
I stored cannabis in a locked, safe location				
Always	8070	62.0%	8951	54.4%
Most of the time	1459	11.2%	1818	11.1%
About half the time	234	1.8%	317	1.9%
Sometimes	809	6.2%	1023	6.2%
Never	2400	18.4%	4275	26.0%
I smoked or vaped cannabis in my car while parked				
Always	-	-	315	1.9%
Most of the time	-	-	241	1.5%
About half the time	-	-	280	1.7%
Sometimes	-	-	2996	18.2%
Never	-	-	12529	76.2%
I smoked or vaped cannabis in my car while driving				
Always	-	-	113	0.7%
Most of the time	-	-	109	0.7%
About half the time	-	-	98	0.6%
Sometimes	-	-	1220	7.4%
Never	-	-	14815	90.1%

On a scale of 1 to 10, how impaired can you be after consuming cannabis and still drive safely? (1 is not impaired at all and able to drive safely; and 10 is heavily impaired and able to drive safely).

1	-	-	5649	34.3%
2	-	-	2371	14.4%
3	-	-	1680	10.2%
4	-	-	932	5.7%
5	-	-	1373	8.3%
6	-	-	637	3.9%
7	-	-	718	4.4%
8	-	-	689	4.2%
9	-	-	358	2.2%
10	-	-	1126	6.8%

In your opinion, how harmful or dangerous are each of the following activities?

Driving under the influence of cannabis				
Very harmful	-	-	4984	30.3%
Moderately harmful	-	-	4050	24.6%
A little harmful	-	-	4852	29.5%
Not harmful at all	-	-	2475	15.0%

Driving under the influence of alcohol				
Very harmful	-	-	14866	90.4%
Moderately harmful	-	-	1268	7.7%
A little harmful	-	-	187	1.1%
Not harmful at all	-	-	61	0.4%
Driving within 3 hours after using cannabis				
Very harmful	-	-	1994	12.1%
Moderately harmful	-	-	3022	18.4%
A little harmful	-	-	4025	24.5%
Not harmful at all	-	-	7324	44.5%
Using cannabis at the same time as alcohol or other substances				
Very harmful	-	-	7614	46.3%
Moderately harmful	-	-	3864	23.5%
A little harmful	-	-	3231	19.6%
Not harmful at all	-	-	1641	10.0%

What medical condition or symptom do you most commonly use cannabis to treat?

Anorexia	131	1%	158	1.0%
Cachexia or wasting syndrome	20	0.2%	21	0.1%
Glaucoma	-	-	169	1.0%
Post Traumatic Stress Disorder (PTSD)	1622	12.5%	2070	12.6%
Seizures	85	0.7%	140	0.9%
Severe nausea	334	2.6%	373	2.3%
Severe or Chronic Pain	5980	46%	8290	50.4%
Severe or Persistent Muscle Spasms	387	3%	423	2.6%
Other chronic condition	4343	33.4%	4740	28.8%

You reported using cannabis to treat "Other chronic condition" in the previous question. Which of the following conditions are you most commonly using cannabis to treat?

Anxiety	-	-	1803	11.0%
Arthritis	-	-	235	1.4%
Attention-deficit/hyperactivity disorder (ADHD)	-	-	108	0.7%
Autism Spectrum Disorder (ASD)	-	-	26	0.2%
Depression	-	-	506	3.1%
Gastrointestinal (stomach) distress	-	-	185	1.1%
Insomnia or sleep disruptions	-	-	1051	6.4%
Other, not listed here	-	-	817	5.0%

	2022		2023	
	n	%	n	%
Think about the medical condition or symptom you most commonly use cannabis to treat. How effective do you feel cannabis has been in treating that condition or symptom?				
Extremely effective	3648	28%	5791	35.2%
Very effective	5981	46%	6961	42.3%
Moderately effective	2782	21.4%	3109	18.9%
Slightly effective	447	3.4%	499	3.0%
Not effective at all	70	0.5%	75	0.5%
When purchasing cannabis at a licensed dispensary, how confident do you feel that you are receiving a safe, uncontaminated product?				
Very high confidence	10212	78.5%	13268	80.7%
Somewhat high confidence	1983	15.2%	2246	13.7%
Neutral	572	4.4%	698	4.2%
Low confidence	92	0.7%	116	0.7%
Very low confidence	49	0.4%	78	0.5%
I have not purchased cannabis at a dispensary in Maryland	32	0.2%	34	0.2%
Select whether the following statements are true for you regarding meeting with a dispensary's Clinical Director (i.e., physician, pharmacist, registered nurse, or other licensed healthcare provider).				
I have met with a Clinical Director in-person at least once				
No	6174	47.5%	7998	48.6%
Yes	5439	41.8%	6764	41.1%
I don't know	1255	9.6%	1564	9.5%
I have met with a Clinical Director by phone or video chat at least once				
No	5638	43.3%	6940	42.2%
Yes	6361	48.9%	8270	50.3%
I don't know	868	6.7%	1094	6.7%
I tried to meet with a Clinical Director, but none were available				
No	11715	90%	14622	88.9%
Yes	195	1.5%	275	1.7%
I don't know	890	6.8%	1268	7.7%
I was not aware Clinical Directors exist				
No	7936	61%	9920	60.3%
Yes	3873	29.8%	4890	29.7%
I don't know	992	7.6%	1397	8.5%

What are the most important factors that keep you in the medical cannabis program now that adult-use cannabis is available in Maryland? Please rank the topics in order of importance where the most important topic is #1.

Wider availability of products and strains

Ranked 1 st	-	-	5626	34.2%
Ranked 2 nd	-	-	3507	21.3%
Ranked 3 rd	-	-	2566	15.6%
Ranked 4 th	-	-	1984	12.1%
Ranked 5 th	-	-	1159	7.0%
Ranked 6 th	-	-	609	3.7%
Ranked 7 th	-	-	239	1.5%
Ranked 8 th	-	-	125	0.8%
Ranked 9 th	-	-	108	0.7%
Ranked 10 th	-	-	106	0.6%

Higher potency of products

Ranked 1 st	-	-	2057	12.5%
Ranked 2 nd	-	-	4493	27.3%
Ranked 3 rd	-	-	2937	17.9%
Ranked 4 th	-	-	2184	13.3%
Ranked 5 th	-	-	1716	10.4%
Ranked 6 th	-	-	1128	6.9%
Ranked 7 th	-	-	743	4.5%
Ranked 8 th	-	-	393	2.4%
Ranked 9 th	-	-	262	1.6%
Ranked 10 th	-	-	116	0.7%

Tax benefit (no taxes)

Ranked 1 st	-	-	3098	18.8%
Ranked 2 nd	-	-	2650	16.1%
Ranked 3 rd	-	-	4008	24.4%
Ranked 4 th	-	-	2356	14.3%
Ranked 5 th	-	-	1533	9.3%
Ranked 6 th	-	-	895	5.4%
Ranked 7 th	-	-	574	3.5%
Ranked 8 th	-	-	393	2.4%
Ranked 9 th	-	-	364	2.2%

Ranked 10 th	-	-	158	1.0%
Education (Clinical Directors)				
Ranked 1 st	-	-	565	3.4%
Ranked 2 nd	-	-	664	4.0%
Ranked 3 rd	-	-	1038	6.3%
Ranked 4 th	-	-	2672	16.2%
Ranked 5 th	-	-	2421	14.7%
Ranked 6 th	-	-	2628	16.0%
Ranked 7 th	-	-	2425	14.7%
Ranked 8 th	-	-	2120	12.9%
Ranked 9 th	-	-	1251	7.6%
Ranked 10 th	-	-	245	1.5%
Higher possession/purchase limits				
Ranked 1 st	-	-	267	1.6%
Ranked 2 nd	-	-	658	4.0%
Ranked 3 rd	-	-	1365	8.3%
Ranked 4 th	-	-	2320	14.1%
Ranked 5 th	-	-	3959	24.1%
Ranked 6 th	-	-	3297	20.0%
Ranked 7 th	-	-	2448	14.9%
Ranked 8 th	-	-	1267	7.7%
Ranked 9 th	-	-	366	2.2%
Ranked 10 th	-	-	82	0.5%
Lower age restrictions				
Ranked 1 st	-	-	77	0.5%
Ranked 2 nd	-	-	61	0.4%
Ranked 3 rd	-	-	94	0.6%
Ranked 4 th	-	-	199	1.2%
Ranked 5 th	-	-	582	3.5%
Ranked 6 th	-	-	2134	13.0%
Ranked 7 th	-	-	2506	15.2%
Ranked 8 th	-	-	3335	20.3%
Ranked 9 th	-	-	5587	34.0%
Ranked 10 th	-	-	1454	8.8%
Stronger legal protections				
Ranked 1 st	-	-	1827	11.1%
Ranked 2 nd	-	-	1338	8.1%

Ranked 3 rd	-	-	1359	8.3%
Ranked 4 th	-	-	1514	9.2%
Ranked 5 th	-	-	1839	11.2%
Ranked 6 th	-	-	2249	13.7%
Ranked 7 th	-	-	3203	19.5%
Ranked 8 th	-	-	1899	11.5%
Ranked 9 th	-	-	692	4.2%
Ranked 10 th	-	-	109	0.7%
Patient-only lines or hours				
Ranked 1 st	-	-	1694	10.3%
Ranked 2 nd	-	-	2065	12.6%
Ranked 3 rd	-	-	1950	11.9%
Ranked 4 th	-	-	2004	12.2%
Ranked 5 th	-	-	1758	10.7%
Ranked 6 th	-	-	1646	10.0%
Ranked 7 th	-	-	1601	9.7%
Ranked 8 th	-	-	2611	15.9%
Ranked 9 th	-	-	578	3.5%
Ranked 10 th	-	-	122	0.7%
Access to delivery services				
Ranked 1 st	-	-	268	1.6%
Ranked 2 nd	-	-	457	2.8%
Ranked 3 rd	-	-	627	3.8%
Ranked 4 th	-	-	731	4.4%
Ranked 5 th	-	-	1006	6.1%
Ranked 6 th	-	-	1353	8.2%
Ranked 7 th	-	-	2101	12.8%
Ranked 8 th	-	-	3514	21.4%
Ranked 9 th	-	-	5580	33.9%
Ranked 10 th	-	-	392	2.4%
Other				
Ranked 1 st	-	-	550	3.3%
Ranked 2 nd	-	-	136	0.8%
Ranked 3 rd	-	-	85	0.5%
Ranked 4 th	-	-	65	0.4%
Ranked 5 th	-	-	56	0.3%
Ranked 6 th	-	-	90	0.5%

Ranked 7 th	-	-	189	1.1%
Ranked 8 th	-	-	372	2.3%
Ranked 9 th	-	-	1242	7.6%
Ranked 10 th	-	-	13244	80.5%

How comfortable do you feel telling or letting the following people know that you consume cannabis?

Family

Definitely not comfortable	627	4.8%	732	4.5%
Probably not comfortable	580	4.5%	662	4.0%
Might or might not feel comfortable	1629	12.5%	2005	12.2%
Somewhat comfortable	2488	19.1%	3061	18.6%
Very comfortable	7598	58.4%	9962	60.6%

Friends

Definitely not comfortable	277	2.1%	424	2.6%
Probably not comfortable	294	2.3%	431	2.6%
Might or might not feel comfortable	1356	10.4%	1779	10.8%
Somewhat comfortable	2300	17.7%	2856	17.4%
Very comfortable	8686	66.8%	10920	66.4%

My primary care provider

Definitely not comfortable	527	4.1%	821	5.0%
Probably not comfortable	635	4.9%	807	4.9%
Might or might not feel comfortable	1295	10%	1495	9.1%
Somewhat comfortable	2391	18.4%	2898	17.6%
Very comfortable	8069	62%	10388	63.2%

Other healthcare providers

Definitely not comfortable	597	4.6%	914	5.6%
Probably not comfortable	807	6.2%	981	6.0%
Might or might not feel comfortable	1871	14.4%	2277	13.8%
Somewhat comfortable	2500	19.2%	3202	19.5%
Very comfortable	7145	54.9%	9027	54.9%

	2022		2023	
	n	%	n	%
In the past year, have you used cannabis for any of the following conditions?				
Anxiety				
No	-	-	4094	24.9%
Yes	-	-	12259	74.5%
Depression				
No	-	-	6792	41.3%
Yes	-	-	9530	57.9%
PTSD				
No	-	-	11031	67.1%
Yes	-	-	5249	31.9%
Bipolar disorder				
No	-	-	14503	88.2%
Yes	-	-	1747	10.6%
Psychosis				
No	-	-	15878	96.5%
Yes	-	-	363	2.2%
Schizophrenia				
No	-	-	16021	97.4%
Yes	-	-	213	1.3%
Substance use disorder				
No	-	-	15502	94.2%
Yes	-	-	722	4.4%
Other emotional or mental health reasons				
No	-	-	10723	65.2%
Yes	-	-	5549	33.7%

Do you feel cannabis has been helpful or harmful for...

Anxiety				
Harmful	-	-	126	0.8%
Helpful	-	-	11835	72.0%
Neither / no impact	-	-	272	1.7%
Depression				
Harmful	-	-	80	0.5%
Helpful	-	-	9013	54.8%
Neither / no impact	-	-	402	2.4%

PTSD					
	Harmful	-	-	39	0.2%
	Helpful	-	-	5039	30.6%
	Neither / no impact	-	-	147	0.9%
Bipolar disorder					
	Harmful	-	-	18	0.1%
	Helpful	-	-	1570	9.5%
	Neither / no impact	-	-	147	0.9%
Psychosis					
	Harmful	-	-	81	0.5%
	Helpful	-	-	252	1.5%
	Neither / no impact	-	-	25	0.2%
Schizophrenia					
	Harmful	-	-	69	0.4%
	Helpful	-	-	123	0.7%
	Neither / no impact	-	-	16	0.1%
Substance use disorder					
	Harmful	-	-	86	0.5%
	Helpful	-	-	607	3.7%
	Neither / no impact	-	-	25	0.2%
Other emotional or mental health reasons					
	Harmful	-	-	27	0.2%
	Helpful	-	-	5299	32.2%
	Neither / no impact	-	-	196	1.2%

During the past year, did you consume cannabis to replace, reduce or stop consumption of the following substances?

Opioids (such as oxycodone, codeine, Vicodin, OxyContin, methadone)

No, N/A	11414	87.7%	14300	86.9%
To reduce	488	3.8%	733	4.5%
To replace	625	4.8%	844	5.1%
To stop use	384	3%	506	3.1%

Benzodiazepines (such as Xanax, clonazepam)

No, N/A	11270	86.6%	14615	88.9%
To reduce	683	5.2%	839	5.1%
To replace	653	5%	643	3.9%
To stop use	298	2.3%	279	1.7%

Anti-depressants (such as fluoxetine and other SSRIs, or venlafaxine, and other SNRIs)

No, N/A	-	-	13782	83.8%
To reduce	-	-	1270	7.7%
To replace	-	-	923	5.6%
To stop use	-	-	394	2.4%

Mood stabilizers (such as lithium, lamotrigine and other anticonvulsants, or Seroquel and other antipsychotics)

No, N/A	-	-	15151	92.1%
To reduce	-	-	539	3.3%
To replace	-	-	447	2.7%
To stop use	-	-	216	1.3%

Alcohol

No, N/A	-	-	13146	79.9%
To reduce	-	-	2097	12.7%
To replace	-	-	689	4.2%
To stop use	-	-	443	2.7%

Tobacco

No, N/A	-	-	15081	91.7%
To reduce	-	-	679	4.1%
To replace	-	-	208	1.3%
To stop use	-	-	402	2.4%

When you use cannabis, how often do you use the following substances in the same sitting, or at the same time?

Alcohol

About half the time	-	-	806	4.9%
Always	-	-	145	0.9%
Never	-	-	7967	48.4%
Occasionally	-	-	6933	42.2%
Usually	-	-	526	3.2%

Tobacco

About half the time	-	-	423	2.6%
Always	-	-	947	5.8%
Never	-	-	12728	77.4%
Occasionally	-	-	1372	8.3%
Usually	-	-	908	5.5%

	2022		2023	
	n	%	n	%
Do you get information about cannabis from the following sources?				
Licensed dispensary				
No	-	-	1096	6.7%
Yes	-	-	15260	92.8%
Clinical Director at a licensed dispensary				
No	-	-	10697	65.0%
Yes	-	-	5554	33.8%
Friends or family				
No	-	-	8918	54.2%
Yes	-	-	7357	44.7%
Primary Care Provider (PCP)				
No	-	-	13051	79.3%
Yes	-	-	3205	19.5%
Certifying provider				
No	-	-	8307	50.5%
Yes	-	-	7926	48.2%
Social media				
No	-	-	14182	86.2%
Yes	-	-	1642	10.0%
Website				
No	-	-	12092	73.5%
Yes	-	-	3636	22.1%
Other				
No	-	-	14379	87.4%
Yes	-	-	995	6.0%

In thinking about adult-use cannabis in Maryland, what do you find are the most important topics on which to educate the public? Please rank the topics in order of importance where the most important topic is #1.

Addiction				
Ranked 1 st	858	6.6%	800	4.9%
Ranked 2 nd	899	6.9%	927	5.6%
Ranked 3 rd	822	6.3%	1001	6.1%
Ranked 4 th	847	6.5%	958	5.8%
Ranked 5 th	845	6.5%	1007	6.1%
Ranked 6 th	916	7.0%	1072	6.5%
Ranked 7 th	933	7.2%	1170	7.1%

Ranked 8 th	1002	7.7%	1264	7.7%
Ranked 9 th	996	7.7%	1239	7.5%
Ranked 10 th	1115	8.6%	1291	7.8%
Ranked 11 th	1287	9.9%	1332	8.1%
Ranked 12 th	1756	13.5%	1451	8.8%
Ranked 13 th	-	-	1566	9.5%
Ranked 14 th	-	-	912	5.5%

Mental health

Ranked 1 st	2249	17.3%	2228	13.5%
Ranked 2 nd	1424	10.9%	1817	11.0%
Ranked 3 rd	1330	10.2%	1575	9.6%
Ranked 4 th	1174	9.0%	1433	8.7%
Ranked 5 th	1114	8.6%	1323	8.0%
Ranked 6 th	1082	8.3%	1292	7.9%
Ranked 7 th	901	6.9%	1141	6.9%
Ranked 8 th	829	6.4%	1064	6.5%
Ranked 9 th	722	5.5%	924	5.6%
Ranked 10 th	595	4.6%	789	4.8%
Ranked 11 th	503	3.9%	695	4.2%
Ranked 12 th	353	2.7%	694	4.2%
Ranked 13 th	-	-	578	3.5%
Ranked 14 th	-	-	437	2.7%

Driving

Ranked 1 st	1286	9.9%	1421	8.6%
Ranked 2 nd	1229	9.4%	1315	8.0%
Ranked 3 rd	1177	9.0%	1327	8.1%
Ranked 4 th	1148	8.8%	1315	8.0%
Ranked 5 th	1229	9.4%	1454	8.8%
Ranked 6 th	1164	8.9%	1333	8.1%
Ranked 7 th	1097	8.4%	1298	7.9%
Ranked 8 th	981	7.5%	1205	7.3%
Ranked 9 th	899	6.9%	1183	7.2%
Ranked 10 th	804	6.2%	1093	6.6%
Ranked 11 th	706	5.4%	943	5.7%
Ranked 12 th	556	4.3%	890	5.4%
Ranked 13 th	-	-	746	4.5%
Ranked 14 th	-	-	467	2.8%

Poisoning/accidental exposure

Ranked 1 st	551	4.2%	530	3.2%
Ranked 2 nd	678	5.2%	685	4.2%
Ranked 3 rd	766	5.9%	795	4.8%
Ranked 4 th	808	6.2%	895	5.4%
Ranked 5 th	873	6.7%	1064	6.5%
Ranked 6 th	959	7.4%	1056	6.4%
Ranked 7 th	1059	8.1%	1214	7.4%
Ranked 8 th	1121	8.6%	1275	7.8%
Ranked 9 th	1167	9.0%	1434	8.7%
Ranked 10 th	1315	10.1%	1454	8.8%
Ranked 11 th	1479	11.4%	1575	9.6%
Ranked 12 th	1500	11.5%	1529	9.3%
Ranked 13 th	-	-	1651	10.0%
Ranked 14 th	-	-	833	5.1%

Delta-8 THC/Hemp products

Ranked 1 st	190	1.5%	310	1.9%
Ranked 2 nd	402	3.1%	547	3.3%
Ranked 3 rd	537	4.1%	666	4.0%
Ranked 4 th	536	4.1%	798	4.9%
Ranked 5 th	647	5.0%	876	5.3%
Ranked 6 th	755	5.8%	958	5.8%
Ranked 7 th	899	6.9%	1099	6.7%
Ranked 8 th	1060	8.1%	1291	7.8%
Ranked 9 th	1297	10.0%	1290	7.8%
Ranked 10 th	1558	12.0%	1475	9.0%
Ranked 11 th	1810	13.9%	1695	10.3%
Ranked 12 th	2585	19.9%	1863	11.3%
Ranked 13 th	-	-	2185	13.3%
Ranked 14 th	-	-	937	5.7%

Public use/use in shared spaces

Ranked 1 st	468	3.6%	658	4.0%
Ranked 2 nd	614	4.7%	893	5.4%
Ranked 3 rd	771	5.9%	1020	6.2%
Ranked 4 th	915	7.0%	1115	6.8%
Ranked 5 th	1002	7.7%	1204	7.3%
Ranked 6 th	1053	8.1%	1290	7.8%

Ranked 7 th	1156	8.9%	1296	7.9%
Ranked 8 th	1162	8.9%	1294	7.9%
Ranked 9 th	1290	9.9%	1336	8.1%
Ranked 10 th	1255	9.6%	1352	8.2%
Ranked 11 th	1341	10.3%	1377	8.4%
Ranked 12 th	1249	9.6%	1311	8.0%
Ranked 13 th	-	-	1228	7.5%
Ranked 14 th	-	-	616	3.7%

Youth cannabis use

Ranked 1 st	1113	8.6%	971	5.9%
Ranked 2 nd	1110	8.5%	1063	6.5%
Ranked 3 rd	1104	8.5%	1025	6.2%
Ranked 4 th	1104	8.5%	1120	6.8%
Ranked 5 th	1082	8.3%	1156	7.0%
Ranked 6 th	1025	7.9%	1179	7.2%
Ranked 7 th	1044	8.0%	1241	7.5%
Ranked 8 th	1085	8.3%	1294	7.9%
Ranked 9 th	1026	7.9%	1244	7.6%
Ranked 10 th	984	7.6%	1243	7.6%
Ranked 11 th	873	6.7%	1296	7.9%
Ranked 12 th	726	5.6%	1310	8.0%
Ranked 13 th	-	-	1197	7.3%
Ranked 14 th	-	-	651	4.0%

Cannabis use during pregnancy

Ranked 1 st	505	3.9%	560	3.4%
Ranked 2 nd	832	6.4%	862	5.2%
Ranked 3 rd	955	7.3%	1024	6.2%
Ranked 4 th	1051	8.1%	1050	6.4%
Ranked 5 th	1154	8.9%	1093	6.6%
Ranked 6 th	1169	9.0%	1259	7.7%
Ranked 7 th	1170	9.0%	1265	7.7%
Ranked 8 th	1174	9.0%	1305	7.9%
Ranked 9 th	1159	8.9%	1403	8.5%
Ranked 10 th	1169	9.0%	1441	8.8%
Ranked 11 th	992	7.6%	1416	8.6%
Ranked 12 th	946	7.3%	1347	8.2%
Ranked 13 th	-	-	1249	7.6%

Ranked 14 th	-	-	716	4.4%
Mixing cannabis with other substances (alcohol, other drugs, and/or prescribed medications)				
Ranked 1 st	923	7.1%	985	6.0%
Ranked 2 nd	1311	10.1%	1259	7.7%
Ranked 3 rd	1338	10.3%	1396	8.5%
Ranked 4 th	1412	10.9%	1495	9.1%
Ranked 5 th	1332	10.2%	1474	9.0%
Ranked 6 th	1135	8.7%	1445	8.8%
Ranked 7 th	1121	8.6%	1412	8.6%
Ranked 8 th	954	7.3%	1298	7.9%
Ranked 9 th	885	6.8%	1127	6.9%
Ranked 10 th	732	5.6%	1092	6.6%
Ranked 11 th	637	4.9%	957	5.8%
Ranked 12 th	496	3.8%	807	4.9%
Ranked 13 th	-	-	755	4.6%
Ranked 14 th	-	-	488	3.0%
Potency, dosage, and delayed onset of products				
Ranked 1 st	1580	12.1%	1454	8.8%
Ranked 2 nd	1559	12.0%	1779	10.8%
Ranked 3 rd	1400	10.8%	1832	11.1%
Ranked 4 th	1286	9.9%	1654	10.1%
Ranked 5 th	1099	8.4%	1458	8.9%
Ranked 6 th	954	7.3%	1310	8.0%
Ranked 7 th	934	7.2%	1150	7.0%
Ranked 8 th	873	6.7%	1026	6.2%
Ranked 9 th	792	6.1%	919	5.6%
Ranked 10 th	750	5.8%	850	5.2%
Ranked 11 th	594	4.6%	783	4.8%
Ranked 12 th	455	3.5%	754	4.6%
Ranked 13 th	-	-	617	3.8%
Ranked 14 th	-	-	404	2.5%
Differences between THC and CBD				
Ranked 1 st	1169	9.0%	1425	8.7%
Ranked 2 nd	1265	9.7%	1610	9.8%
Ranked 3 rd	1129	8.7%	1520	9.2%
Ranked 4 th	1053	8.1%	1420	8.6%

Ranked 5 th	935	7.2%	1226	7.5%
Ranked 6 th	995	7.6%	1236	7.5%
Ranked 7 th	938	7.2%	1115	6.8%
Ranked 8 th	985	7.6%	1065	6.5%
Ranked 9 th	996	7.7%	993	6.0%
Ranked 10 th	1003	7.7%	1112	6.8%
Ranked 11 th	1054	8.1%	954	5.8%
Ranked 12 th	754	5.8%	1035	6.3%
Ranked 13 th	-	-	818	5.0%
Ranked 14 th	-	-	461	2.8%

Legal issues

Ranked 1 st	1384	10.6%	1259	7.7%
Ranked 2 nd	953	7.3%	1136	6.9%
Ranked 3 rd	947	7.3%	1101	6.7%
Ranked 4 th	944	7.3%	1136	6.9%
Ranked 5 th	965	7.4%	1188	7.2%
Ranked 6 th	1070	8.2%	1162	7.1%
Ranked 7 th	1024	7.9%	1151	7.0%
Ranked 8 th	1051	8.1%	1229	7.5%
Ranked 9 th	1047	8.0%	1292	7.9%
Ranked 10 th	996	7.7%	1205	7.3%
Ranked 11 th	1000	7.7%	1245	7.6%
Ranked 12 th	895	6.9%	1103	6.7%
Ranked 13 th	-	-	1156	7.0%
Ranked 14 th	-	-	627	3.8%

Educating healthcare providers about cannabis use

Ranked 1 st	-	-	3040	18.5%
Ranked 2 nd	-	-	1860	11.3%
Ranked 3 rd	-	-	1479	9.0%
Ranked 4 th	-	-	1303	7.9%
Ranked 5 th	-	-	1131	6.9%
Ranked 6 th	-	-	999	6.1%
Ranked 7 th	-	-	965	5.9%
Ranked 8 th	-	-	827	5.0%
Ranked 9 th	-	-	890	5.4%
Ranked 10 th	-	-	805	4.9%
Ranked 11 th	-	-	784	4.8%

Ranked 12 th	-	-	777	4.7%
Ranked 13 th	-	-	687	4.2%
Ranked 14 th	-	-	443	2.7%
Other				
Ranked 1 st	-	-	349	2.1%
Ranked 2 nd	-	-	237	1.4%
Ranked 3 rd	-	-	229	1.4%
Ranked 4 th	-	-	298	1.8%
Ranked 5 th	-	-	336	2.0%
Ranked 6 th	-	-	399	2.4%
Ranked 7 th	-	-	475	2.9%
Ranked 8 th	-	-	554	3.4%
Ranked 9 th	-	-	717	4.4%
Ranked 10 th	-	-	788	4.8%
Ranked 11 th	-	-	938	5.7%
Ranked 12 th	-	-	1120	6.8%
Ranked 13 th	-	-	1557	9.5%
Ranked 14 th	-	-	7993	48.6%

In the previous question, you ranked mental health as one of the 3 most important topics for public education. We want to understand what kind of mental health information would be most helpful. Please rank the following topics in order of importance where the most important topic is #1.

How cannabis helps mental health conditions

Ranked 1 st	-	-	3638	22.1%
Ranked 2 nd	-	-	860	5.2%
Ranked 3 rd	-	-	497	3.0%
Ranked 4 th	-	-	321	2.0%
Ranked 5 th	-	-	80	0.5%
Ranked 6 th	-	-	18	0.1%

How cannabis harms mental health conditions

Ranked 1 st	-	-	209	1.3%
Ranked 2 nd	-	-	935	5.7%
Ranked 3 rd	-	-	655	4.0%
Ranked 4 th	-	-	831	5.1%
Ranked 5 th	-	-	2115	12.9%
Ranked 6 th	-	-	669	4.1%

Medical cannabis products for specific conditions (terpenes, THC/CBD ratio, potency, etc.)

Ranked 1 st	-	-	684	4.2%
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Ranked 2 nd	-	-	1721	10.5%
Ranked 3 rd	-	-	1324	8.0%
Ranked 4 th	-	-	956	5.8%
Ranked 5 th	-	-	705	4.3%
Ranked 6 th	-	-	24	0.1%
How to use cannabis safely when you have a mental health condition				
Ranked 1 st	-	-	592	3.6%
Ranked 2 nd	-	-	1176	7.1%
Ranked 3 rd	-	-	1889	11.5%
Ranked 4 th	-	-	1280	7.8%
Ranked 5 th	-	-	462	2.8%
Ranked 6 th	-	-	15	0.1%
How cannabis interacts with mental health prescription medication				
Ranked 1 st	-	-	254	1.5%
Ranked 2 nd	-	-	702	4.3%
Ranked 3 rd	-	-	1031	6.3%
Ranked 4 th	-	-	1958	11.9%
Ranked 5 th	-	-	1414	8.6%
Ranked 6 th	-	-	55	0.3%
Other				
Ranked 1 st	-	-	37	0.2%
Ranked 2 nd	-	-	20	0.1%
Ranked 3 rd	-	-	18	0.1%
Ranked 4 th	-	-	68	0.4%
Ranked 5 th	-	-	638	3.9%
Ranked 6 th	-	-	4633	28.2%

During the past year, how many times were you treated in an emergency room or urgent care facility for any reason related to cannabis consumption?

More than three times	9	0.1%	11	0.1%
Never	12784	98.3%	16253	98.8%
Once	96	0.7%	101	0.6%
Three times	10	0.1%	19	0.1%
Twice	27	0.2%	38	0.2%

	2022		2023	
	n	%	n	%
How often during the past 6 months did you find that you were not able to stop using cannabis once you had started?				
Daily or almost daily	-	-	381	2.3%
Less than monthly	-	-	1633	9.9%
Monthly	-	-	275	1.7%
Not Applicable, did not try to stop	-	-	13806	83.9%
Weekly	-	-	177	1.1%
How often in the past 6 months have you devoted a great deal of your time to getting, using, or recovering from cannabis?				
Daily or almost daily	-	-	867	5.3%
Less than monthly	-	-	1789	10.9%
Monthly	-	-	894	5.4%
Never	-	-	12031	73.1%
Weekly	-	-	761	4.6%
How often in the past 6 months have you had a problem with your memory or concentration after using cannabis?				
Daily or almost daily	-	-	609	3.7%
Less than monthly	-	-	3239	19.7%
Monthly	-	-	851	5.2%
Never	-	-	10877	66.1%
Weekly	-	-	794	4.8%
How interested are you in reducing or cutting back on your cannabis consumption on a scale of 0 (not interested at all) to 10 (very interested)?				
0	3661	28%	4013	24.4%
1	5195	40%	8010	48.7%
2	861	7%	1032	6.3%
3	637	5%	734	4.5%
4	360	3%	366	2.2%
5	666	5%	715	4.3%
6	272	2%	250	1.5%
7	257	2%	267	1.6%
8	159	1%	160	1.0%
9	60	1%	77	0.5%
10	200	2%	212	1.3%

If the State developed a cannabis helpline to assist people who are interested in reducing or stopping cannabis use, do you think it would be utilized?

No	-	-	5491	33.4%
Unsure	-	-	7056	42.9%
Yes	-	-	3882	23.6%

In the past year, when you purchased cannabis for yourself, how much did you typically spend per purchase? Mean (standard deviation)

12837	\$122.19 (\$86.85)	16338	\$118.98 (\$81.40)
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Do you currently own or rent your home?

Other (example, staying with family)	-	-	1702	10.3%
Own	-	-	10654	64.8%
Rent	-	-	4021	24.4%

Does your rental lease agreement prohibit or ban the use of cannabis inside your home?

I don't know	-	-	945	5.7%
No	-	-	2266	13.8%
Yes	-	-	802	4.9%

Do you ever smoke or vape cannabis inside of your rental home (including flower, oil, or concentrates)?

No	-	-	1395	8.5%
Yes	-	-	2626	16.0%

I worry about smoking or vaping cannabis in my rental...

A little	-	-	536	3.3%
A moderate amount	-	-	154	0.9%
Frequently	-	-	103	0.6%
Not at all	-	-	1833	11.1%

In the past month, have you smoked or vaped cannabis in the following locations?

Public Recreation Area (Park, Beach, Pool, etc.)

No	-	-	13662	83.1%
Yes	-	-	2733	16.6%

Public transportation

No	-	-	16172	98.3%
Yes	-	-	224	1.4%

Workplace or office

No	-	-	15446	93.9%
Yes	-	-	949	5.8%

Event venues (sports, concerts, etc.)

No	-	-	13722	83.4%
Yes	-	-	2674	16.3%

Bar or Restaurant

No	-	-	14528	88.3%
Yes	-	-	1864	11.3%
Other				
No	-	-	13781	83.8%
Yes	-	-	1880	11.4%

In the past month, did you consume cannabis in your car or personal vehicle because it was prohibited by your landlord?

No	-	-	570	3.5%
Yes	-	-	229	1.4%

Do you live in a multi-unit housing complex, such as an apartment building?

No	-	-	2175	13.2%
Yes	-	-	1841	11.2%

How common is it for you to smell a neighbor's cannabis smoke or vape?

Daily	-	-	1651	10.0%
Never, or hardly ever	-	-	11415	69.4%
Once a month	-	-	1351	8.2%
Once a week	-	-	2009	12.2%

How has legalization of adult-use cannabis affected the supply of the medical cannabis products you typically purchase?

Improved - there is more supply available	-	-	1732	10.5%
No change	-	-	9220	56.1%
Worsened - there is less supply available	-	-	5450	33.1%

How has legalization of adult-use cannabis affected the price of the medical cannabis products you typically purchase?

Improved - prices have become more affordable	-	-	1402	8.5%
No change	-	-	8481	51.6%
Worsened - prices have become more expensive	-	-	6474	39.4%

How often did you use the following dispensary features since adult-use became available on July 1, 2023?

Cannabis delivery services

All the time	-	-	773	4.7%
Never	-	-	13867	84.3%
Sometimes	-	-	1349	8.2%
Usually	-	-	370	2.2%

Patient-only lines or hours

All the time	-	-	8153	49.6%
Never	-	-	3859	23.5%
Sometimes	-	-	2201	13.4%

Usually	-	-	2169	13.2%
Clinical Directors				
All the time	-	-	436	2.7%
Never	-	-	13652	83.0%
Sometimes	-	-	1926	11.7%
Usually	-	-	328	2.0%
Curbside pickup				
All the time	-	-	1511	9.2%
Never	-	-	10688	65.0%
Sometimes	-	-	3163	19.2%
Usually	-	-	1002	6.1%
Drive through pickup				
All the time	-	-	1521	9.2%
Never	-	-	11690	71.1%
Sometimes	-	-	2251	13.7%
Usually	-	-	901	5.5%
Access to medical-only products				
All the time	-	-	9341	56.8%
Never	-	-	2965	18.0%
Sometimes	-	-	1937	11.8%
Usually	-	-	2107	12.8%

What is the primary reason that you used cannabis delivery services from a dispensary?

Convenience	-	-	1513	9.2%
Dispensaries do not meet my accessibility needs	-	-	35	0.2%
I do not have a caregiver	-	-	39	0.2%
I do not have transportation available to me	-	-	196	1.2%
Long lines at dispensaries	-	-	212	1.3%
Other, please specify:	-	-	377	2.3%
To avoid driving while impaired	-	-	77	0.5%

Have you purchased cannabis without using your medical card (i.e., as an adult-use consumer)?

No	-	-	15124	92.0%
Yes	-	-	1309	8.0%

What is the primary reason you purchased adult-use cannabis?

I exceeded medical allotment	-	-	222	1.3%
I prefer anonymity of adult-use market	-	-	234	1.4%
Other reason(s)	-	-	821	5.0%

	2022		2023	
	n	%	n	%
Do you plan to remain in the medical cannabis program by renewing your certification?				
I don't know	-	-	1791	10.9%
No	1130	8.7%	304	1.8%
Yes	8026	61.7%	14307	87.0%
What is the primary reason you plan to leave the medical program?				
Higher cost of medical cannabis products	-	-	17	0.1%
Cost of annual recertification from a certifying healthcare provider	-	-	114	0.7%
The amount of paperwork/administration in the medical program (e.g. the registration, certification, and card process are burdensome/confusing)	-	-	13	0.1%
Concern over purchasing/possessing a firearm (medical cannabis patients are prohibited from purchasing/possessing firearms)	-	-	35	0.2%
I prefer anonymity of adult-use market	-	-	11	0.1%
The products I use are sold on the adult-use market (don't require a medical card)	-	-	79	0.5%
Other	-	-	33	0.2%
In the past year, have you noticed educational campaigns or public health messages about cannabis in the following places?				
School				
No	-	-	15016	91.3%
Yes	-	-	1206	7.3%
Work				
No	-	-	14961	91.0%
Yes	-	-	1263	7.7%
Websites				
No	-	-	10669	64.9%
Yes	-	-	5574	33.9%
Email or text messages				
No	-	-	12897	78.4%
Yes	-	-	3328	20.2%
Gas stations				
No	-	-	15297	93.0%
Yes	-	-	922	5.6%
Bars, pubs, or nightclubs				
No	-	-	15186	92.3%

Yes	-	-	1021	6.2%
Dispensaries				
No	-	-	6000	36.5%
Yes	-	-	10242	62.3%
Doctor's office or pharmacy				
No	-	-	13699	83.3%
Yes	-	-	2510	15.3%
Events like sporting events, concerts, festivals, or markets				
No	-	-	14793	89.9%
Yes	-	-	1392	8.5%
TV or radio				
No	-	-	11568	70.3%
Yes	-	-	4635	28.2%
Billboards or posters				
No	-	-	11699	71.1%
Yes	-	-	4492	27.3%
Print newspapers or magazines				
No	-	-	13355	81.2%
Yes	-	-	2821	17.2%
At the movies				
No	-	-	15515	94.3%
Yes	-	-	660	4.0%
Public transportation				
No	-	-	15064	91.6%
Yes	-	-	1097	6.7%
Flyers or postal mail				
No	-	-	14905	90.6%
Yes	-	-	1269	7.7%
Social media				
No	-	-	10275	62.5%
Yes	-	-	5909	35.9%
Other				
No	-	-	15377	93.5%
Yes	-	-	549	3.3%

	2022		2023	
	n	%	n	%
Some dispensaries and companies make clothing, hats, paraphernalia, bags or other merchandise with the brand on it. In the past year, have you purchased clothing or merchandise that has a cannabis brand name or logo on it?				
No	-	-	13272	80.7%
Unsure	-	-	230	1.4%
Yes	-	-	2928	17.8%
How many days in the past month did you use each method of cannabis consumption?				
Smoked from glassware, bowl, or bong, pre-roll, joint, etc.				
0 Days	3089	23.7%	4995	30.4%
1-4 Days	1714	13.2%	2276	13.8%
11-20 Days	1448	11.1%	1509	9.2%
21-30 Days	4223	37.5%	5774	35.1%
5-10 Days	1330	10.2%	1326	8.1%
Consumed edibles				
0 Days	3829	29.4%	4712	28.6%
1-4 Days	3428	26.3%	4236	25.8%
11-20 Days	1388	10.7%	1755	10.7%
21-30 Days	1629	12.5%	2668	16.2%
5-10 Days	2185	16.8%	2507	15.2%
Vaped cannabis				
0 Days	4331	33.3%	6021	36.6%
1-4 Days	2093	16.1%	2700	16.4%
11-20 Days	1623	12.5%	1848	11.2%
21-30 Days	1623	12.5%	3330	20.2%
5-10 Days	1742	13.4%	1970	12.0%
Dabbing, oil, wax, shatter, butter				
0 Days	10149	78.0%	13113	79.7%
1-4 Days	771	5.9%	1094	6.7%
11-20 Days	371	2.9%	399	2.4%
21-30 Days	633	4.9%	690	4.2%
5-10 Days	519	4.0%	546	3.3%
Capsules or tablets				
0 Days	10875	83.6%	14107	85.8%
1-4 Days	817	6.3%	865	5.3%
11-20 Days	160	1.2%	196	1.2%

21-30 Days	213	1.6%	274	1.7%
5-10 Days	365	2.8%	400	2.4%
Tinctures or oral sprays (elixirs)				
0 Days	10929	84.0%	13888	84.4%
1-4 Days	771	5.9%	1023	6.2%
11-20 Days	166	1.3%	219	1.3%
21-30 Days	209	1.6%	259	1.6%
5-10 Days	360	2.8%	433	2.6%
Topicals (balm, lotion, cream)				
0 Days	9713	74.7%	12025	73.1%
1-4 Days	1190	9.1%	1615	9.8%
11-20 Days	411	3.2%	628	3.8%
21-30 Days	313	2.4%	561	3.4%
5-10 Days	802	6.2%	1003	6.1%
Transdermal (patch)				
0 Days	12220	93.9%	15488	94.2%
1-4 Days	112	0.9%	158	1.0%
11-20 Days	19	0.1%	30	0.2%
21-30 Days	28	0.2%	45	0.3%
5-10 Days	31	0.2%	77	0.5%
Rectal/vaginal suppositories				
0 Days	12348	94.9%	15688	95.4%
1-4 Days	40	0.3%	49	0.3%
11-20 Days	5	0.0%	10	0.1%
21-30 Days	10	0.1%	24	0.1%
5-10 Days	10	0.1%	20	0.1%

During the past month, how many times did you drive/operate a car or other motor vehicle within three hours of consuming cannabis and/or when you were under the influence of cannabis?

0 times	10382	79.8%	9498	57.7%
1 time	482	3.7%	922	5.6%
2-3 times	835	6.4%	2078	12.6%
4-5 times	226	1.7%	799	4.9%
6 or more times	831	6.4%	2562	15.6%
I did not use cannabis in the past 30 days	158	1.2%	35	0.2%

In the past month, what percentage of your cannabis consumption was medical vs. non-medical (i.e., recreational)?

100% medical use	8298	63.8%	11029	67.1%
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75% medical, 25% non-medical	2474	19%	2889	17.6%
50% medical, 50% non-medical	1547	11.9%	1585	9.6%
25% medical, 75% non-medical	231	1.8%	255	1.6%
100% non-medical	100	0.8%	104	0.6%

How many days within the past week did you use cannabis?

0	-	-	640	3.9%
1	-	-	768	4.7%
2	-	-	994	6.0%
3	-	-	1094	6.7%
4	-	-	990	6.0%
5	-	-	1362	8.3%
6	-	-	1086	6.6%
7	-	-	8910	54.2%

Which method did you most commonly use to consume cannabis in the past month?

Capsules or tablets	128	1.0%	94	0.6%
Dabbing, oil, wax, shatter, butter concentrates	467	3.6%	254	1.5%
Ingesting edibles	2622	20.2%	2120	12.9%
Rectal/vaginal suppositories	10	0.1%	2	0.0%
Smoking dried flower	6101	46.9%	3813	23.2%
Tinctures or oral sprays (elixirs)	178	1.4%	93	0.6%
Topicals (balm, lotion, cream)	176	1.4%	137	0.8%
Vaping cannabis	2737	21.0%	1754	10.7%

In the past month, how many grams did you typically consume of cannabis flower (bud) each week?

Mean (standard deviation)

6039	12.46 (11.52)	3785	12.04 (11.46)
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In a typical session (or sitting), how many grams of cannabis flower (bud) do you consume?

Mean (standard deviation)

6026	0.92 (0.86)	3733	0.92 (0.85)
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What is the typical THC potency (percent of THC) of the cannabis flower that you have consumed in the past month? You may not know exactly, but please give it your best guess.

Between 10-15%	89	0.7%	53	0.3%
Between 15-20%	457	3.5%	231	1.4%
Between 20-25%	2024	15.6%	1041	6.3%
Between 25-35%	2701	20.8%	1797	10.9%
Between 35-50%	197	1.5%	183	1.1%

Between 50-60%	54	0.4%	54	0.3%
Between 60-80%	152	1.2%	138	0.8%
Greater than 80%	63	0.5%	88	0.5%

What is the typical CBD potency (percent of CBD) of the cannabis flower that you have consumed in the past month? You may not know exactly, but please give it your best guess.

Between 10-15%	595	4.6%	357	2.2%
Between 15-20%	371	2.9%	221	1.3%
Between 20-25%	458	3.5%	234	1.4%
Between 25-35%	466	3.6%	273	1.7%
Between 35-50%	105	0.8%	89	0.5%
Between 50-60%	38	0.3%	36	0.2%
Between 60-80%	37	0.3%	1535	9.3%
Greater than 80%	36	0.3%	24	0.1%

How much do you typically spend on cannabis flower per week?

Mean (standard deviation)

6043	\$71.22 (\$53.16)	3781	\$61.92 (\$49.72)
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Typically, how many milligrams of THC are in the cannabis edibles you consume per sitting (e.g., session)?

5 mg or less of THC	703	5.4%	499	3.0%
6-10 mg of THC	988	7.6%	728	4.4%
11-15 mg of THC	208	1.6%	151	0.9%
16-20 mg of THC	173	1.3%	170	1.0%
21-30 mg of THC	209	1.6%	187	1.1%
31-40 mg of THC	152	1.2%	188	1.1%
41-50 mg of THC	40	0.3%	53	0.3%
51-60 mg THC	14	0.1%	15	0.1%
61 or more mgs of THC	39	0.3%	47	0.3%

How much money do you typically spend on cannabis edibles per week? Mean (standard deviation)

2575	\$36.78 (\$33.78)	2085	\$29.90 (\$29.67)
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	2022		2023	
	n	%	n	%
During the past month, did you typically consume cannabis edibles that were higher in THC, higher in CBD, or that contain somewhat equal amounts of THC and CBD?				
Higher in THC	1344	10.3%	1131	6.9%
Higher in CBD	220	1.7%	192	1.2%
Contains roughly the same amounts of each	858	6.6%	644	3.9%
In a typical session (sitting) where you vape cannabis, how many hits or draws do you take?				
Mean (standard deviation)				
	2731	5.49 (5.04)	1749	5.70 (5.65)
On a typical day when you vape cannabis, how many sessions (sittings) do you have?				
0 sessions	5	0%	6	0.0%
1 session	728	5.6%	464	2.8%
2 sessions	676	5.2%	398	2.4%
3 sessions	487	3.7%	329	2.0%
4 sessions	268	2.1%	171	1.0%
5 sessions	229	1.8%	150	0.9%
6 sessions	93	0.7%	61	0.4%
7 sessions	33	0.3	37	0.2%
8 sessions	61	0.5%	33	0.2%
9 sessions	8	0.1%	1	0.0%
10 sessions	46	0.4%	32	0.2%
11 or more sessions	99	0.8%	65	0.4%
In the past month, how many grams per week did you vape cannabis oil/concentrates?				
Less than one gram	1144	8.8%	826	5.0%
1-2 grams	690	5.3%	433	2.6%
3-4 grams	232	1.8%	149	0.9%
5-10 grams	132	1%	64	0.4%
11-15 grams	32	0.2%	17	0.1%
16-20 grams	18	0.1%	4	0.0%
21-30 grams	12	0.1%	4	0.0%
More than 30 grams	4	0%	5	0.0%
What is the typical potency (percent of THC) of the vape products that you have consumed in the past month?				
Between 0-9%	31	0.2%	29	0.2%
Between 10-19%	69	0.5%	43	0.3%
Between 20-29%	267	2.1%	180	1.1%

Between 30-39%	78	0.6%	64	0.4%
Between 40-49%	44	0.3%	25	0.2%
Between 50-59%	53	0.4%	36	0.2%
Between 60-69%	72	0.6%	46	0.3%
Between 70-79%	860	6.6%	463	2.8%
Between 80-89%	761	5.8%	547	3.3%
90% or more	46	0.4%	62	0.4%

What is the typical CBD content of the vape products you have consumed in the past month?

Between 0-9%	919	7.1%	224	1.4%
Between 10-19%	271	2.1%	109	0.7%
Between 20-29%	172	1.3%	54	0.3%
Between 30-39%	91	0.7%	44	0.3%
Between 40-49%	69	0.5%	576	3.5%
Between 50-59%	91	0.7%	60	0.4%
Between 60-69%	15	0.1%	13	0.1%
Between 70-79%	39	0.3%	21	0.1%
Between 80-89%	28	0.2%	16	0.1%
90% or more	8	0.1%	5	0.0%

How much do you typically spend on vaping cannabis each week? Mean (standard deviation)

2721	\$46.66 (\$41.90)	1733	\$39.41 (\$36.53)
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In a typical session (sitting) where you use cannabis concentrates, how many hits do you take (dabs, oils, wax, shatter)? Mean (standard deviation)

467	4.17 (4.92)	253	3.74 (3.18)
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On a typical day you consume cannabis concentrates how many sessions (sittings) do you have?

1	37	0.3%	4	0.0%
2	79	0.6%	25	0.2%
3	93	0.7%	49	0.3%
4	75	0.6%	65	0.4%
5	60	0.5%	34	0.2%
6	31	0.2%	27	0.2%
7	12	0.1%	18	0.1%
8	16	0.1%	6	0.0%
9	2	0%	5	0.0%
10	8	0.1%	2	0.0%
11 or more	22	0.2%	7	0.0%

What is the typical THC potency (percent of THC) of the concentrates that you have consumed in the past month?

Between 0-9%	1	0%	2	0.0%
Between 10-19%	4	0%	2	0.0%
Between 20-29%	18	0.1%	8	0.0%
Between 30-39%	4	0%	3	0.0%
Between 40-49%	2	0%	4	0.0%
Between 50-59%	4	0%	3	0.0%
Between 60-69%	11	0.1%	8	0.0%
Between 70-79%	187	1.4%	87	0.5%
Between 80-89%	198	1.5%	107	0.7%
90% or more	14	0.1%	16	0.1%

What is the typical CBD potency (percent of CBD) of the concentrates that you have consumed in the past month?

Between 0-9%	236	1.8%	115	0.7%
Between 10-19%	44	0.3%	28	0.2%
Between 20-29%	18	0.1%	16	0.1%
Between 30-39%	12	0.1%	8	0.0%
Between 40-49%	10	0.1%	4	0.0%
Between 50-59%	4	0%	11	0.1%
Between 60-69%	3	0%	1	0.0%
Between 70-79%	8	0.1%	5	0.0%
Between 80-89%	9	0.1%	3	0.0%
90% or more	6	0%	2	0.0%

How much money do you typically spend on cannabis concentrates per week?

Mean (standard deviation)

465	\$95.50 (\$59.74)	254	\$79.71 (\$57.13)
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Appendix B.

Table B1. Average Days of Use in Past Month by Method of Administration and Demographic Characteristics, 2023 and 2022 Samples

		Flower	Edible	Vape	Concentrate	Capsule	Tincture	Topical	Patch	Suppository
2023 Survey Responses										
Age Group	18 to 20	13.5	3.6	12.1	5.0	0.5	0.5	1.1	0.2	0.1
	21 to 25	13.8	4.9	11.1	4.6	0.6	0.6	1.6	0.2	0.1
	26 to 35	14.2	6.0	10.2	3.7	0.8	0.8	1.8	0.3	0.1
	36 to 45	12.3	7.4	10.4	2.5	0.9	0.9	1.9	0.2	0.1
	46 to 55	11.5	8.6	8.6	1.6	1.0	1.1	2.6	0.2	0.0
	56 to 65	11.2	8.6	6.9	0.9	1.0	0.9	2.5	0.1	0.0
	66 to 75	9.9	9.0	6.1	0.7	1.1	1.2	2.5	0.2	0.1
	76 to 86	6.6	9.9	5.8	0.5	1.3	2.1	3.5	0.1	0.1
	86 or older ^	3.8	15.2	4.9	1.4	1.8	3.9	7.0	1.8	1.1
Gender Identity	Male	12.7	6.8	8.6	2.4	0.9	0.9	1.5	0.1	0.1
	Female	11.0	8.6	8.4	1.5	1.0	1.1	2.8	0.2	0.1
	Transgender female ^	9.6	3.6	7.4	3.3	0.7	1.6	0.5	0.0	0.0
	Transgender male ^	15.9	5.5	8.2	3.1	0.8	0.1	3.1	0.1	0.0
	Nonbinary	12.1	8.4	10.5	3.8	1.0	1.3	2.9	0.4	0.2
	Not included above ^^	7.9	13.0	11.9	2.8	2.3	5.1	3.9	1.7	3.7
Race	American Indian or Alaska Native	13.2	6.0	8.6	2.2	1.6	1.7	2.1	0.1	0.0
	Asian	10.1	7.1	9.8	2.4	0.7	0.7	1.3	0.0	0.0
	Black or African American	11.7	5.6	5.8	1.4	0.6	1.0	2.1	0.2	0.1
	Native Hawaiian or Other Pacific Islander ^	11.8	7.1	6.8	2.4	0.8	1.5	3.9	1.3	0.0
	White or Caucasian	11.6	8.4	9.1	2.0	1.0	1.0	2.2	0.1	0.1
	Other race	12.5	6.2	8.1	3.1	1.3	1.2	3.3	0.6	0.2
	Two or more races	13.5	6.9	8.8	2.8	1.4	1.0	2.7	0.2	0.0
2022 Survey Responses										

Age Group	18 to 20	15.3	3.3	12.9	5.3	0.5	0.3	0.8	0.0	0.0
	21 to 25	15.6	4.2	10.7	5.0	0.6	0.7	1.1	0.1	0.0
	26 to 35	14.7	5.9	10.2	3.6	0.9	0.8	1.6	0.2	0.1
	36 to 45	13.3	7.1	10.4	2.5	1.0	1.0	1.6	0.1	0.0
	46 to 55	12.1	7.9	8.8	1.7	1.1	1.0	2.2	0.2	0.1
	56 to 65	12.2	7.9	6.9	0.8	1.1	1.1	2.3	0.1	0.0
	66 to 75	10.7	8.1	6.0	0.6	1.2	1.3	2.1	0.0	0.0
	76 to 86	7.6	8.4	5.8	0.5	1.9	2.3	2.5	0.0	0.2
	86 or older ^^	2.0	8.4	2.0	2.5	4.2	3.5	7.8	1.8	1.8
Gender Identity	Male	13.9	6.3	9.1	2.8	1.0	0.8	1.3	0.1	0.0
	Female	12.0	7.7	8.8	1.8	1.0	1.2	2.3	0.1	0.0
	Transgender female ^	16.3	6.6	9.3	6.0	3.0	2.3	1.6	1.1	1.1
	Transgender male ^	13.6	4.1	12.8	4.0	1.5	0.1	3.4	0.0	0.0
	Nonbinary	13.2	6.6	10.0	1.8	0.9	1.0	2.3	0.1	0.0
	Not included above ^^	17.0	7.6	11.8	3.6	3.2	0.4	1.0	0.0	0.0
Race	American Indian or Alaska Native	12.4	7.6	7.3	2.8	1.5	0.9	2.3	0.1	0.0
	Asian	10.8	6.7	8.3	2.7	1.1	1.0	1.5	0.1	0.0
	Black or African American	14.0	5.7	6.5	1.4	0.7	0.9	2.1	0.2	0.1
	Native Hawaiian or Other Pacific Islander ^^	15.2	7.2	13.7	3.7	2.0	2.0	3.8	1.4	1.4
	White or Caucasian	12.7	7.4	9.3	2.3	1.1	1.0	1.8	0.1	0.0
	Other race	14.1	5.9	9.4	3.3	1.0	0.9	2.0	0.1	0.0
	Two or more races	14.7	5.9	9.4	3.0	1.4	1.3	2.1	0.2	0.0

^ small sample size (n < 50)

^^ very small sample size (n < 20)

Note: orange-highlighted cells indicate the method with the highest reported frequency for each demographic subgroup (each row)