Cannabis use prevalence, patterns, and reasons for use among patients with cancer and survivors in a state without legal cannabis access

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Abstract

Purpose: Cannabis use among patients with cancer is common, yet data are limited regarding use patterns, reasons for use, and degree of benefit, which represents an unmet need in cancer care delivery. This need is salient in states without legal cannabis programs, where perceptions and behavior among providers and patients may be affected.

Methods: A cross-sectional survey of patients with cancer and survivors at the Hollings Cancer Center at the Medical University of South Carolina (no legal cannabis marketplace in SC) was completed as part of the NCI Cannabis Supplement. Patients (ages 18+) were recruited using probability sampling from patient lists (N=7,749 sampled; N=1,036 completers). Weight-adjusted Chi-square tests compared demographics and cancer details among patients using cannabis since diagnosis versus those not using cannabis, while weighted descriptives are presented for cannabis use prevalence, consumption, symptom management, and legalization beliefs.

Results: Weighted prevalence of cannabis use since diagnosis was 26%, while current cannabis use was 15%. The most common reasons for cannabis use after diagnosis were: difficulty sleeping (50%), pain (46%), mood changes, and stress, anxiety or depression (45%). Symptom improvement was endorsed for pain (57%), stress/anxiety/depression (64%), difficulty sleeping (64%), and loss of appetite (40%).

Conclusions: Among patients with cancer and survivors at a NCI-designated cancer center within SC, a state without legal access to medical cannabis, prevalence rates and reasons for cannabis use are consistent with emerging literature in oncology populations. These findings have implications for care delivery and work is needed to inform recommendations for providers and patients.

Keywords

cannabis; marijuana; cancer; symptom management; supportive care

INTRODUCTION

Cannabis use is common among patients with cancer and survivors, with prevalence estimates ranging from 8% to upwards of 40% endorsing cannabis use [1–7]. There are numerous cancer- and treatment-related symptoms or side effects that patients use cannabis to manage (e.g., pain, improving nausea/vomiting, stimulating appetite, improving sleep, anxiety and depression, etc.) [8–11]. Cross-sectional surveys and qualitative work indicate that patients with cancer are reporting benefits associated with cannabis use, and a preference for cannabis over other pharmacological strategies (e.g., opioids) [12, 13]. Early evidence also suggests a favorable safety profile, low rates of serious side effects, and efficacy for managing select symptoms [14–17].

While cannabis use is common to manage symptoms among patients with cancer, data are limited regarding the degree of clinical benefit, as well as the harms associated with cannabis use among this population. This represents an unmet need for patients and an area of cancer care delivery that requires further study, evidence, and clinical guideline recommendations development. This unmet need is particularly salient in states where legal cannabis access is restricted and perceptions and behavior surrounding cannabis among both providers and patients may be affected. Currently, 37 US states have approved comprehensive medical cannabis legislation and 21 states have approved cannabis use for recreational (non-medical) purposes [18]. States without legal access to cannabis products are now in the minority and may be excluded from research and public health efforts due to logistical, regulatory, confidentiality and legality concerns in conducting this work. Data from 2014–2015 among the general population using cannabis in the past year found that cannabis use for medical purposes only and for both medical and non-medical purposes (compared to non-medical use only) was 18% in states with legal medical cannabis vs. 4% in states without legal medical cannabis marketplaces [19]. However, recent data show that rates of medical cannabis use are similar between states with illegal cannabis (23%) compared to states with legal medical access (25%) [20], which may continue to grow, particularly among those with medical conditions, including cancer [21, 22].

The National Cancer Institute (NCI)-designated Hollings Cancer Center at the Medical University of South Carolina primarily serves patients from across the state of South Carolina (SC), where cannabis access is illegal (though low ^{9}-tetrahydrocannnabinol [THC] and high cannabidiol [CBD] products are widely available and CBD for epilepsy is indicated/available). Research specifically focused on cannabis use among a cancer

population within states that do not have a legal cannabis marketplace is limited. Patients in illegal states may be using cannabis in an unapproved manner, without the recommendation of a provider, or in place of other, potentially efficacious symptom management strategies. These patients may also be underreporting their cannabis use, potentially contributing to inaccurate prevalence estimates within these states. A better understanding is needed of the use of cannabis among patients with cancer and survivors as it pertains to the management of disease- or treatment-related symptoms. Therefore, the goal of this cross-sectional survey study was to; 1) obtain prevalence estimates of cannabis use among patients with cancer and survivors from a NCI-designated cancer center within a state lacking legal cannabis access, 2) characterize cannabis consumption patterns among our patient population, 3) evaluate reasons for use and degree of symptom management, and 4) assess legalization beliefs and potential behavior change resulting from legalization.

MATERIALS AND METHODS

This study included a one-time, cross-sectional survey of patients with cancer and survivors at the NCI-designated Hollings Cancer Center (HCC) at the Medical University of South Carolina (MUCH) Health system in Charleston, SC (US). This survey was part of the NCI Cannabis Supplement, which was awarded to 12 P30 cancer centers across the US (P30 CA138313, PI Dubois, Supplement PI, McClure). The NCI Cannabis Supplements were intended to capture the rapidly evolving landscape of medical cannabis use among cancer patients undergoing treatment, which is impacted by differences in legality of use and other factors across different cancer center catchment areas.

Data Source and Sampling

Probability sampling methods were used to identify eligible patients within our population. To be eligible, patients had to meet the following inclusion criteria; 1) age 18+, 2) be able to read and understand English, and 3) must have a received a cancer diagnosis and/or cancer care since 2018 at the HCC or an MUSC clinic in Charleston, SC. When the sampling frame was generated, patients were excluded from the list who were known to be deceased or if they had opted-out of research contact.

Cancer registry data were used to construct the sampling frame and draw a simple random sample of HCC patients seen from January 2018 to December 2020. The Biomedical Informatics Center (BMIC) at MUSC selected 6,000 HCC patient records from the eligible pool with confirmed cancer diagnosis codes to be contacted. Due to lower than anticipated response rates initially, an additional random sample of 2,000 patients was selected from the remaining patient list to be contacted (8,000 records selected total; 5 removed prior to contact). A total of 7,995 patients were eligible to participate (Figure 1). Among those, 246 patients responded to survey invitations and were determined to be ineligible, largely due to self-reports of cancer status (no cancer diagnosis) or date of diagnosis (before 2018), leaving 7,749 eligible for survey completion (sample) out of 9,748 patients (frame) from the pre-defined timeframe. Research staff received confirmation that 124 of those patients were deceased following survey invitations. A total of 1,048 patients provided consent and started the survey. The total response rate was 13.5% (1,048 out of 7,749).

Survey Invitations and Administration

Sampled HCC patients were invited to participate in the survey via email, text message, mailed letter, and/or phone calls between June 2021 and April 2022. Given institutional research contact guidelines at the time of survey administration, a maximum of three contact attempts were allowed within a 6-month period. All 7,749 patients received at least one survey invitation. Patients who were eligible completed the survey either through a web-based REDCap instrument [23] or a staff-administered phone-based survey. Participants agreed to complete the survey, which served as their consent after the purpose of the survey and risks were reviewed. The survey took approximately 10–30 minutes to complete (varied based on skip logic). Patients were excluded from participation during phone-based surveys if staff had concerns regarding comprehension or if someone other than the patient attempted to complete the survey. Respondents who completed the survey were compensated with a $20 Amazon gift card. All procedures were approved by the MUSC IRB.

Measures

The survey instrument was developed collaboratively between all 12 NCI Cannabis Supplement cancer centers, NCI program staff, and ICF technical support. The final survey instrument included core items that were harmonized across cancer centers and additional questions that were included in the MUSC HCC survey.

Demographics and cancer details.—Demographics to inform the non-responder analysis were extracted from the MUSC electronic medical record (EMR). Demographics were also self-reported through the survey (optional). EMR demographics included age, sex at birth, race, and ethnicity and were used to weight the sample. Additional patient-reported demographics collected and presented here include education, employment, and percentage residing in SC at the time of diagnosis and currently residing in SC. Cancer details, including primary cancer and treatment status, were patient-reported.

Cannabis use.—The following definition of cannabis was used: *"When we use the term 'cannabis' we are referring to any of the following: Marijuana, Cannabis concentrates, Edibles, lotions, ointments, tinctures containing cannabis, CBD-only products, Pharmaceutical or prescription cannabinoids (e.g., Dronabinol, Nabilone, Marinol, Syndros, Cesamet), Other products made with cannabis."* All participants were asked about their use of cannabis prior to their cancer diagnosis (ever use) and at any time since diagnosis. If no cannabis use was endorsed since reported diagnosis start date, participants were asked if they considered using cannabis. For those endorsing cannabis use since diagnosis, additional items were asked: current use of cannabis, use during cancer treatment (and how often), use after cancer treatment (and how often), methods of use, THC to CBD content, and medical and/or non-medical reasons for use. If respondents endorsed current cannabis use, additional characteristics were collected: days used in the past month, frequency of use, times per day, medical vs. non-medical use, interest in quitting or reducing. Current use of cannabis was defined as; those endorsing current use ("Are you currently using cannabis?") and/or past 30-day use of cannabis ("When was the last time you used cannabis?").

Reasons for use.—Among respondents endorsing cannabis use since their diagnosis, reasons for use were assessed. The list included 13 reasons for cannabis use since diagnosis (check all that apply) with an option to select "Used for cancer symptom or cancer treatment side effect not listed here" and "Other reason." Both options branched to open-text fields.

Symptom management.—Symptom improvement or worsening was assessed using a 5-point Likert scale (improved quite a bit, somewhat improved, no change, somewhat worsened, and worsened quite a bit) for each symptom listed. The option, "I do not have this symptom" was available for each item. Other options were available to indicate another symptom (not on the list) and if cannabis improved or worsened that symptom. Other open-text symptoms are not shown here.

Legalization perceptions.—Perceptions regarding cannabis legalization in SC were assessed among all respondents. A 5-point Likert scale was used to assess how cannabis use may be affected, if it were to be legalized in SC ("If South Carolina were to legalize cannabis for adult use, would you say this would…") with options indicating more or less likely to use/try cannabis. Additional questions were asked on a 5-point Likert scale (Strongly Disagree to Strong Agree) regarding conversations with providers if cannabis were legal, obtaining a prescription, visiting a dispensary, and their beliefs on legalization.

Statistical Methods

Weighting procedures.—A total of 1,048 patients started the survey (Figure 1). Weighting procedures were based on 1,036 respondents (12 excluded due to high rates of missing data). A total of three respondents did not provide information about their cannabis use and are not included in cannabis use results. Sample weights were constructed based on selection probabilities, non-response adjustment, and post-stratification via raking to match the sample to known subgroup proportions in the target population (population control totals shown in Supplemental Table 1 with additional weighting information). Weighted prevalence estimates provided here are representative of the population receiving a diagnosis or cancer care at the HCC or affiliated MUSC clinic in Charleston, SC (though participants did not have to live in Charleston, SC).

The final sample proportions by demographics are similar to the proportions presented in the population totals from the HCC's sampling frame with a few exceptions. In the HCC population totals, nearly 22% were 75 years old and older. This percentage is lower (17%) among the 1,036 survey respondents. There were more White respondents completing the survey compared to the HCC population (83% vs. 75%).

Responder analysis.—Demographic comparisons between survey responders and non-responders are shown in Supplemental Table 2. The non-response analysis found significant differences in the response rate by age, sex, and race.

Analyses.—Weighted descriptive percentages are presented, in addition to respondent counts to items. Weight-adjusted Chi-square tests were conducted to examine differences in demographics, primary cancer site, and cancer treatment status between patients using cannabis since diagnosis versus those not using cannabis. Analyses were conducted using

the *svyset* function in Stata 15.1 [24], which specifies design characteristics using sampling units and weights. The finite population correction factor was used for all standard error estimates due to the size of the sample relative to the target population (>5%).

RESULTS

Demographics and Cancer Details

Weighted demographics (from both the EMR and patient-reported survey) for all participants, as well as separated by cannabis use since diagnosis, are shown in Table 1. The majority of the sample was 65 years of age and older, White, and Non-Hispanic. Over 90% of the sample was residing in SC at the time of their cancer diagnosis. Among those using cannabis since their diagnosis compared to those not using cannabis, group differences were demonstrated such that younger adults and individuals who were disabled reported using cannabis at higher rates, while retired patients had lower column percentages of cannabis use compared other employment categories.

Patient-reported primary cancer site showed that 24% of the sample had a breast cancer diagnosis, and 73% had completed cancer treatment at the time of the survey (Supplemental Table 3). There were no significant differences in primary cancer site or cancer treatment status between those using cannabis since diagnosis compared to those not using cannabis. We did not have data on remission status or if cancers were deemed no longer curable.

Cannabis Prevalence and Consumption Patterns

Weighted cannabis prevalence and consumption patterns are shown in Table 2. Cannabis use prevalence at any point since cancer diagnosis was 26% (n=293) among patients and 15% endorsed current use of cannabis (comprising 57% of those having used since diagnosis). Cannabis use during cancer treatment was reported by 60% of those endorsing use since diagnosis, while 64% reported using after cancer treatment (among those having started or completed treatment). Use for medical purposes was endorsed among 44% while an additional 37% endorsed cannabis use for both medical and non-medical purposes. THC:CBD ratio varied across the sample, though 35% did not know the ratio or content of cannabis used. Combustible (smoked) cannabis and edible forms were the most commonly endorsed modes of use, with 38% endorsing combustible cannabis use as the primary method of use and an additional 27% endorsing edible use as primary. Frequency of use and any medical use of cannabis was similar among the sub-sample of those currently using cannabis (n=168). Interest in quitting or reducing cannabis use among those currently using was low (~2.0 on a 10-point scale; 10=extremely interested in quitting).

Reasons for Cannabis use after Diagnosis

Weighted reasons for cannabis use after diagnosis are shown in Figure 2, in order of most common reason to least common reason. The most common reasons for cannabis use after cancer diagnosis were: difficulty sleeping (50%), pain (46%), mood changes, stress, anxiety or depression (45%), followed by the endorsement of recreational use (34%).

Symptom Management

Weighted symptom improvement or worsening due to cannabis use (among those endorsing cannabis use since diagnosis; n=293) is shown in Figure 3. Symptom improvement (among those experiencing that symptom who endorsed improved quite a bit or somewhat improved) was endorsed for pain (57%), stress/anxiety/depression (64%), difficulty sleeping (64%), and loss of appetite (40%). Other symptoms listed generally showed no change due to cannabis use. Few respondents endorsed that cannabis worsened any symptoms and the most common symptom worsened by cannabis was fatigue.

Legalization Perceptions

All respondents were asked about legalization perceptions. Likelihood of trying cannabis or continuing to use cannabis if legalized in SC is shown in Figure 4. The majority responded that legalization in SC would not affect their decision to try cannabis or continue using cannabis (59%). Some respondents (38%) endorsed being more likely or much more likely to try it or continue using cannabis, if legal. Generally, respondents endorsed greater comfort with healthcare provider discussions in a legal environment (for both patient and provider; Figure 5). Endorsement for medical legalization was present among the sample (agree or strongly agree; 75%) but was mixed regarding the likelihood of pursuing legal access of cannabis through a medical card or dispensary.

DISCUSSION

This cross-sectional survey of patients with cancer and survivors at a NCI-designated cancer center within SC, a state without legal access to medical or non-medical cannabis, aimed to characterize patient population estimates of cannabis use, patterns, reasons for use and symptom management. Weighted cannabis use prevalence was 26% since diagnosis, with 15% of the patient population currently using cannabis. Rates of cannabis use among cancer patients and survivors reported in the literature range from 8% to upwards of 40% [1–7]. The rates of cannabis use found among our patient population in SC are consistent with estimates from Pergram et al. (2017), which found rates of cannabis use at 24% among patients currently undergoing cancer treatment and within a state with a mature legal cannabis marketplace (Washington state) [1]. In future work, primary cancer site, stage and/or type of cancer treatment will be important to differentiate as cannabis use rates may be greater during certain types of treatment to manage symptoms.

Among patients reporting cannabis use since their cancer diagnosis, 44% reported use for medical purposes, while 38% endorsed medical and non-medical use of cannabis. The reasons for use most frequently endorsed included difficulty sleeping, pain, and mood changes, which are consistent with previous literature in cancer and general populations [11, 25–27]. Subjective symptom improvement was also reported for such symptoms as pain, stress/anxiety/depression, and difficulty sleeping. Improvements in symptoms are likely to contribute to better functioning and potentially improved quality of life during cancer treatment and may serve to maintain cannabis use following treatment. It is unknown within our patient population if cannabis was being used as an alternative to evidence-based

treatment strategies that may have failed to yield benefit, or if these relevant issues were not being discussed with the cancer care team.

Legality status of cannabis, specifically illegal status, may have implications for patient and provider perceptions and behavior; potentially contributing to increased stigma associated with cannabis, lower rates of cannabis use disclosure when assessed, and uncertainty around lower harm product recommendations. Given that SC does not have legal medical cannabis access, understanding cannabis use characteristics and perceptions regarding legalization among our patient population was important to capture. Generally, patients reported that a legal environment would improve comfort for both patients and providers in discussing cannabis use. Further, 17% of patients who reported not having used cannabis since diagnosis responded that they had considered using it, suggesting that a proportion of our oncology patients are open to cannabis use and may have pursued cannabinoids as an option if legal status were different.

The prevalent use of cannabis among our oncology patient population further supports the need to promote patient-provider discussions regarding cannabis and the development of best practice guidelines for the use of cannabis for symptom management. Research has described potential strategies for addressing cannabis use with patients based on providers' clinical experiences and emerging data [28], but cancer care clinical guidelines do not make recommendations regarding cannabis use given insufficient evidence from the literature [16]. Despite suggestions for how to manage patient cannabis use, past research has found that the majority of surveyed oncologists (70%) reported that they did not feel sufficiently knowledgeable about medical cannabis to advise their patients on its use, though 80% endorsed having discussions with patients regarding medical cannabis [29]. The most commonly reported barriers to making recommendations included monitoring the patient's use of cannabis (54%), prescribing an accurate dose (61%) or strain (53%), and having insufficient research (50%) [30]. Further, screening for cannabis use and documentation in the medical record has been shown to underreport and underrepresent use rates [31].

While there is an increasing body of research on the potential benefits of cannabinoids (mostly focused on THC and CBD for certain conditions), there remains insufficient evidence to support its use for many other conditions and symptoms [32–34]. However, data from this survey and within the larger literature indicate patient-reported, subjective benefits to the use of cannabis, though there are important harms to address as part of cancer care. Among those using cannabis during and after cancer treatment, 42% and 31% respectively were using daily or almost daily, which signifies regular use that could be associated with cannabis-related harms or cannabis use disorder (CUD) [35]. While combustible cannabis use has not been conclusively linked to increased lung cancer risk, it is associated with adverse pulmonary and respiratory outcomes [36, 37], and our results showed that 38% of those using cannabis since diagnosis used combustible methods primarily. There are additional cannabis-related harms to consider, which are particularly relevant to an older adult population (e.g., polypharmacy, impairment-associated falls and injuries, neuropsychiatric events, cardiovascular considerations, etc.) [28, 38–41], as well as recent data linking cannabis use to impaired activity of immunomodulatory agents, including

cancer immunotherapy [28], in addition to the potential legal consequences of cannabis use in certain states.

Limitations

This study had several limitations. First, early survey invitations included language about cannabis use, though invites clarified that patients did not have to use cannabis to be eligible. However, patients with positive experiences with cannabis may have been more likely to respond. Given the legality status of cannabis in SC, respondents may have underreported their use or may have been hesitant to participate. To address these concerns, survey invitations were modified during the study to eliminate mention of cannabis and focus the language on health behavior more generally. Though underreporting of cannabis is a concern, rates of use in our patient sample were similar to those found among cancer patients in Washington state, which has a mature legal cannabis marketplace [1]. Second, the survey response rate (13.5%) was lower than what has been shown in other health services surveys [42], which may have been the result of limited contact attempts to the sample and not having a participant-facing paper version of the survey to mail to patients. Third, 73% of the sample had completed cancer treatment at the time of survey completion and responses regarding cannabis use and symptom management were retrospective, potentially by several years. Finally, while this survey did include questions regarding CBD-dominant products (and included CBD in the definition of cannabis), questions did not specifically ask about more recently available, hemp-derived THC-dominant cannabinoids (Δ^8-THC, Δ^{10}-THC) [43]. These products are widely available in SC in both physical retail and online marketplaces but were not adequately captured as part of this survey.

Conclusions

This cross-sectional survey of patients with cancer and survivors at a NCI-designated cancer center within SC, a state without legal access to medical or non-medical cannabis, found cannabis prevalence rates and reasons for use consistent with the emerging literature in oncology populations. The prevalent use of cannabis among our oncology patient population further supports the need for high-quality, rigorous data on the benefits and harms associated with cannabis use among a cancer population to inform best practice guidelines and shared decision-making among patients and providers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

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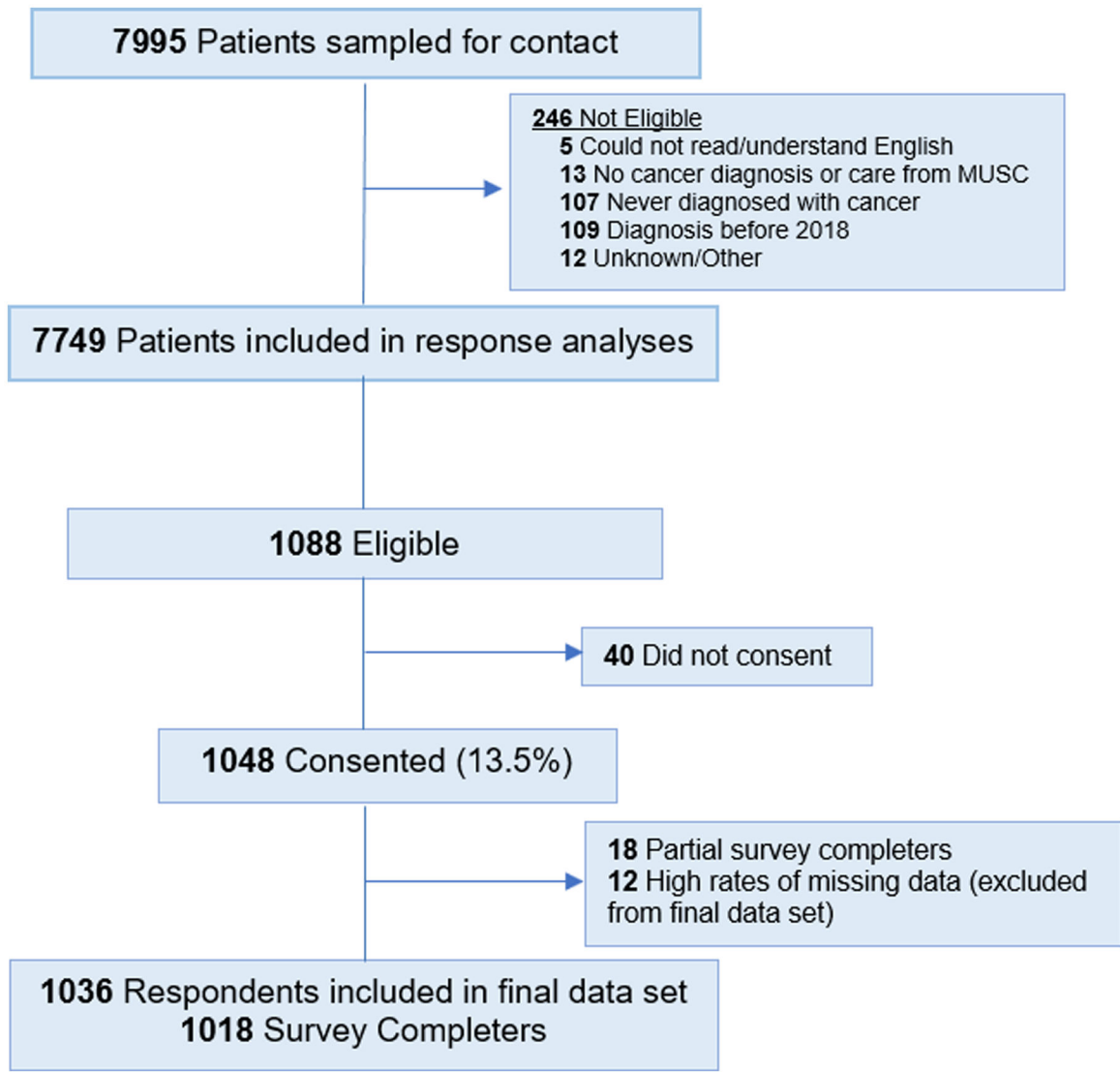
Figure 1.
Flow diagram of survey responders.
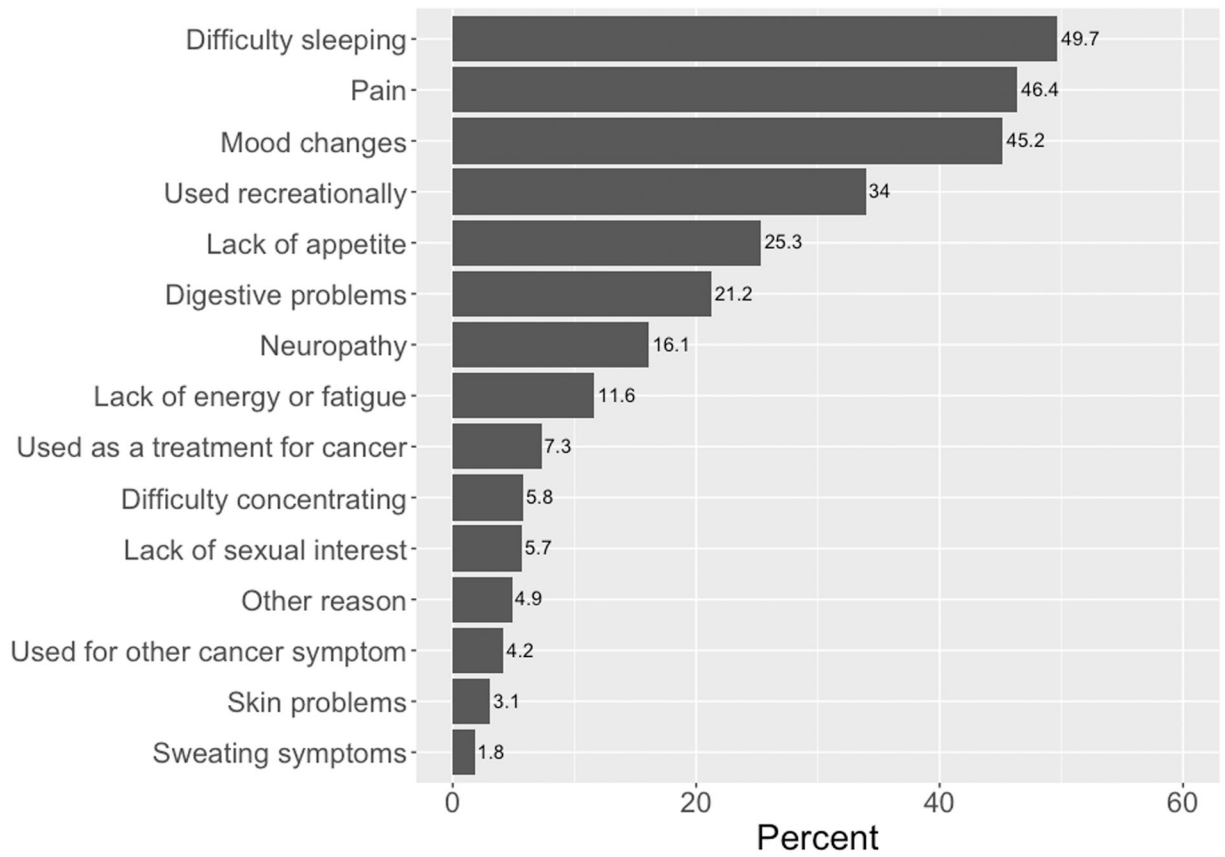
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Reasons for cannabis use after cancer diagnosis.
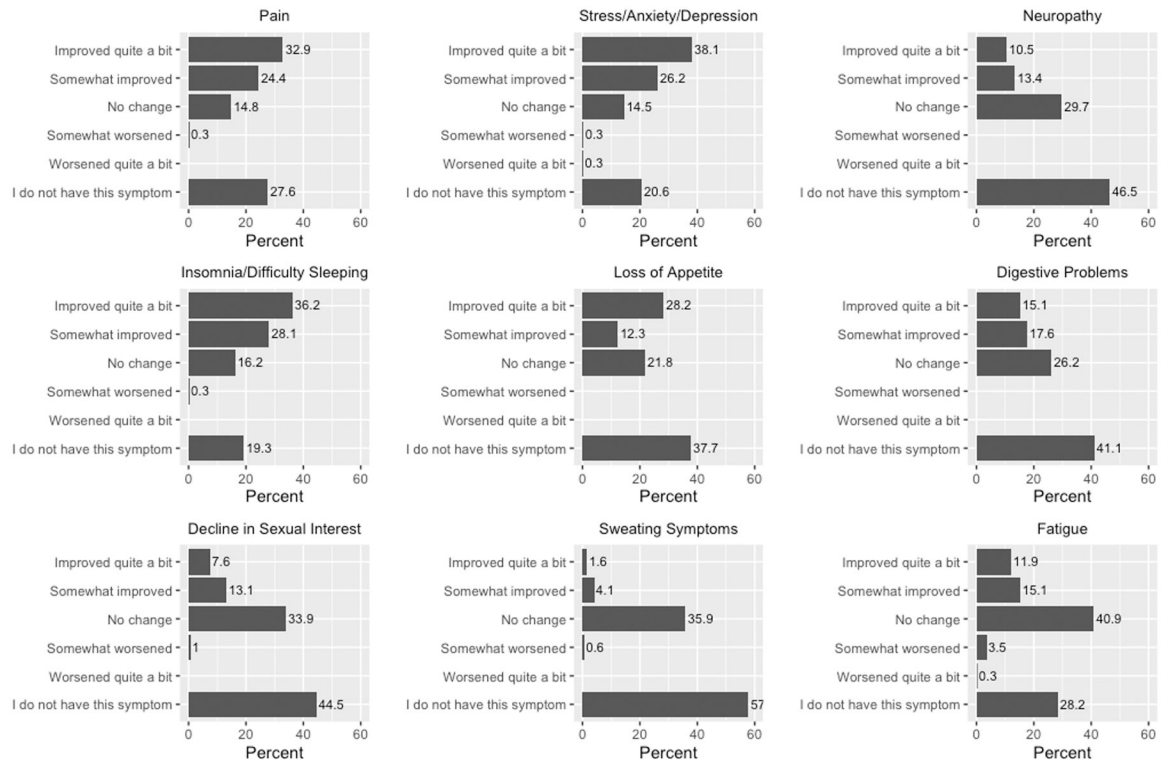
Figure 3.
Symptom improvement or worsening with cannabis among patients endorsing cannabis use since diagnosis.

Figure 4.
Legalization beliefs and perceptions asked of all survey respondents, regardless of cannabis use history and current use.

Figure 5.
Legalization beliefs and behavior changes in a legal environment (asked of all survey respondents).

Table 1.

Demographic characteristics of survey respondents (N=1036), separated by patient endorsement of cannabis use since cancer diagnosis (available cannabis use data for n=1033).

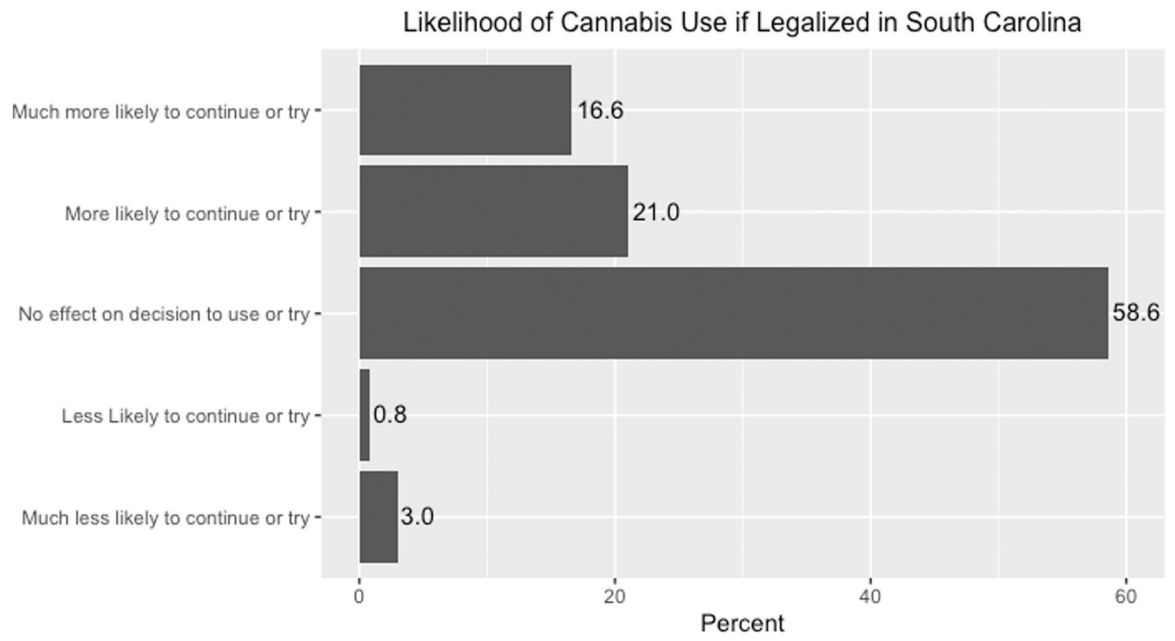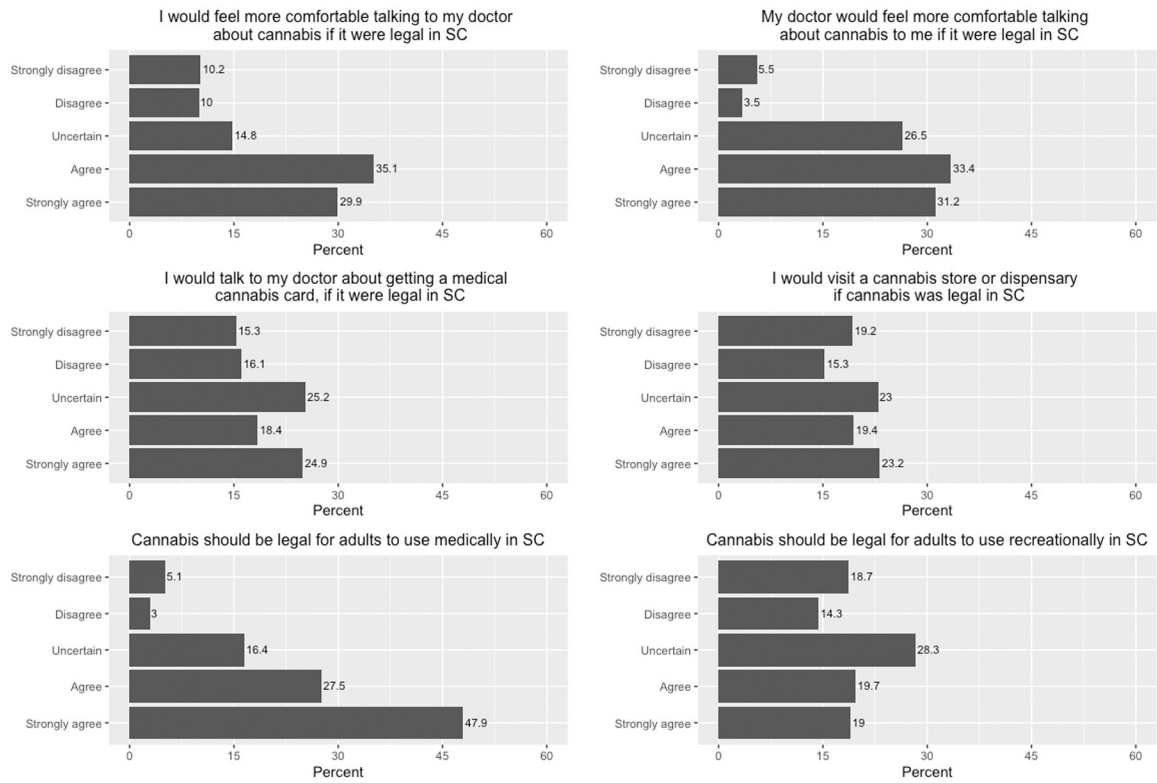|	Demographics	All Participants (N=1036)		Cannabis Use Since Dx (n=293)		No Cannabis Use Since Dx (n=740)		p-value
		n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	
Age	18–44	123	10.3 (9.9 – 10.8)	57	17.8 (16.8 – 18.9)	65	7.6 (7.2 – 8.1)	
	45–54	147	11.5 (11.2 – 11.9)	44	12.6 (11.7 – 13.5)	102	11.0 (10.5 – 11.5)	
	55–64	242	22.8 (22.1 – 23.4)	85	30.5 (29.2 – 31.9)	157	20.1 (19.4 – 20.8)	
	65–74	374	33.0 (32.2 – 33.7)	94	32.2 (30.9 – 33.6)	279	33.3 (32.5 – 34.1)	
	75+	150	22.5 (21.7 – 23.2)	13	6.8 (6.1 – 7.7)	137	28.0 (27.1 – 28.9)	**<.001**
Sex at birth	Female	617	53.8 (53.0 – 54.5)	173	52.7 (51.3 – 54.2)	442	54.1 (53.2 – 55.0)	
	Male	419	46.2 (45.5 – 47.0)	120	47.3 (45.9 – 48.7)	298	45.9 (45.0 – 46.8)	.694
Race	White	880	74.8 (74.0 – 75.5)	255	76.7 (75.2 – 78.1)	622	74.0 (73.1 – 74.9)	
	Black	126	20.8 (20.1 – 21.5)	32	20.2 (18.8 – 21.6)	94	21.1 (20.2 – 22.0)	
	Asian/Pacific Islander	5	0.7 (0.6 – 0.9)	1	0.5 (0.3 – 0.8)	4	0.8 (0.6 – 1.0)	
	Other/Unknown	25	3.7 (3.4 – 4.1)	5	2.6 (2.1 – 3.2)	20	4.1 (3.7 – 4.6)	.654
Ethnicity	Hispanic	13	1.8 (1.6 – 2.1)	4	2.1 (1.7 – 2.7)	9	1.7 (1.5 – 2.0)	
	Non-Hispanic/Unknown	1,023	98.2 (97.9 – 98.4)	289	97.9 (97.3 – 98.3)	731	98.3 (98.0 – 98.6)	.654
Education[†]	Some high school	26	3.7 (3.3 – 4.1)	12	5.7 (5.0 – 6.5)	14	3.0 (2.6 – 3.4)	
	High school diploma	99	10.6 (10.1 – 11.1)	23	8.6 (7.8 – 9.5)	76	11.3 (10.7 – 12.0)	
	Vocational/technical	63	6.3 (5.9 – 6.7)	23	8.3 (7.5 – 9.1)	40	5.6 (5.2 – 6.1)	
	Some college	212	20.4 (19.8 – 21.0)	53	19.1 (17.9 – 20.3)	159	20.9 (20.2 – 21.7)	
	College degree	322	29.6 (28.9 – 30.3)	93	29.4 (28.2 – 30.7)	229	29.7 (28.9 – 30.6)	
	Postgraduate training	287	26.9 (26.3 – 27.6)	80	25.4 (24.2 – 26.6)	207	27.6 (26.8 – 28.4)	
	Missing/Refused	27	2.5 (2.3 – 2.7)	9	3.6 (3.0 – 4.2)	15	1.9 (1.6 – 2.1)	.094
Employment[†]	Employed	350	30.5 (29.9 – 31.2)	118	37.2 (35.8 – 38.6)	232	28.3 (27.5 – 29.1)	
	Retired	501	51.5 (50.7 – 52.3)	107	38.1 (36.7 – 39.5)	394	56.3 (55.4 – 57.2)	
	Unemployed	35	3.9 (3.5 – 4.2)	12	4.2 (3.7 – 4.9)	23	3.7 (3.4 – 4.2)	
	Disabled	83	8.5 (8.1 – 9.0)	37	14.3 (13.2 – 15.4)	46	6.5 (6.1 – 7.0)	
	Other	43	3.6 (3.3 – 3.9)	10	3.1 (2.6 – 3.6)	33	3.8 (3.5 – 4.1)	**<.001**

Demographics		All Participants (N=1036)		Cannabis Use Since Dx (n=293)		No Cannabis Use Since Dx (n=740)		p-value
		n	Weighted % (95% CI)	n	Weighted % (95% CI)	n	Weighted % (95% CI)	
	Missing	24	2.0 (1.8 – 2.2)	9	3.2 (2.7 – 3.7)	12	1.4 (1.2 – 1.6)	
Residence†	SC at time of diagnosis	979	95.0 (94.7 – 95.3)	279	95.2 (94.6 – 95.8)	697	94.9 (94.6 – 95.3)	.361
	SC currently	960	93.0 (92.6 – 93.4)	265	90.7 (89.9 – 91.5)	692	93.8 (93.3 – 94.2)	.586

Notes: Three respondents (out of 1,036) did not provide any information about their cannabis use and are not included in cannabis use results (n=1033 with available cannabis use data). Demographics were patient-reported in the survey (optional) and obtained from the EMR to account for non-response. Aged used here is from patient-reported date of birth and age at the time of the survey. Dx=cancer diagnosis.

† = patient report demographics. SC=South Carolina. *p*-values are from weight-adjusted Chi-square tests.

Table 2.

Cannabis use prevalence and patterns among; 1) all survey respondents providing sufficient cannabis use data (n=1033), 2) patients endorsing use of cannabis since their cancer diagnosis (n=293), and 3) patients endorsing current cannabis use (n=168).

All respondents (n=1033)		Respondents (n)	Weighted % (95% CI)
Ever used cannabis (before dx)		545	49.6 (48.8 – 50.3)
Used cannabis since dx		293	25.9 (25.3 – 26.6)
Considered using cannabis (among those not having used it since dx; n=740)		137	16.6 (16.0 – 17.3)
Currently using cannabis		168	14.7 (14.2 – 15.2)
Used cannabis since dx (n=293)		**Respondents (n)**	**Weighted % (95% CI)**
Used during cancer treatment (n=283)		170	59.8 (58.4 – 61.2)
Freq of use during treatment (n=170)			
	1+ time per day	20	12.3 (11.1 – 13.7)
	1x per day or almost every day	54	30.1 (28.4 – 31.8)
	Few times a week	37	24.2 (22.5 – 26.0)
	Few times a month	34	18.6 (17.2 – 20.0)
	Once a month or less	8	5.6 (4.7 – 6.7)
	A few times	17	9.2 (8.2 – 10.4)
Used cannabis after treatment (n=249)		191	64.2 (62.8 – 65.5)
Freq of use after treatment (n=191)			
	1+ time per day	16	8.0 (7.1 – 8.9)
	1x per day or almost every day	46	23.0 (21.5 – 24.5)
	Few times a week	35	20.6 (19.1 – 22.2)
	Few times a month	29	14.2 (13.0 – 15.5)
	Once a month or less	27	12.5 (11.5 – 13.7)
	A few times	36	20.3 (18.9 – 21.8)
Days of use (past 30) – mean (SD)		17.1 (11.2)	--
Reasons for use since dx			
	Medical	126	43.8 (42.3 – 45.2)
	Non-medical	54	19.6 (18.5 – 20.8)
	Both medical and non-medical	108	36.6 (35.2 – 38.0)
THC:CBD content			
	Higher THC and lower CBD	74	25.9 (24.7 – 27.2)
	Higher CBD and lower THC	36	10.8 (10.0 – 11.7)
	Equal THC to CBD	30	11.2 (10.3 – 12.2)
	CBD only	48	15.4 (14.4 – 16.4)
	Don't know	100	36.7 (35.3 – 38.1)
Methods of cannabis used[*]			
	Smoking	151	52.5 (51.1 – 53.9)
	Eating	159	52.9 (51.5 – 54.3)

	Respondents (n)	Weighted % (95% CI)
Drinking	15	5.5 (4.9 – 6.2)
By mouth (pills, tinctures, sublingually)	85	26.6 (25.4 – 27.9)
Vaping (e-cigarette like vaporizer)	55	18.2 (17.1 – 19.3)
Dabbing (waxes or shatter)	17	5.0 (4.4 – 5.5)
Applying (lotion, cream, topical)‡	76	23.7 (22.5 – 24.9)
Cannabis methods used – mean (SD)	1.9 (1.2)	--
Primary method of cannabis use		
Smoking	98	37.8 (36.4 – 39.3)
Eating	80	27.0 (25.8 – 28.3)
Drinking	4	1.2 (1.0 – 1.6)
By mouth	49	15.8 (14.9 – 16.9)
Vaping	20	6.7 (6.0 – 7.4)
Dabbing	1	0.3 (0.2 – 0.4)
Applying	36	11.2 (10.3 – 12.1)

Currently using cannabis (n=168)	**Respondents (n)**	**Weighted % (95% CI)**
Freq of past 30-day use		
1+ time per day	24	15.0 (13.7 – 16.5)
1x per day or almost every day	51	28.3 (26.7 – 30.0)
Few times a week	44	27.8 (26.1 – 29.6)
Few times a month	28	17.3 (15.8 – 18.8)
Once a month or less	14	7.0 (6.2 – 7.9)
Only tried it once or twice	6	4.1 (3.4 – 5.0)
Times used per day†		
1	101	57.3 (55.4 – 59.2)
2	44	29.0 (27.2 – 30.8)
3–4	17	9.9 (8.8 – 11.1)
5–9	3	2.0 (1.5 – 2.7)
20 or more	2	1.8 (1.3 – 2.6)
Reasons for use in the past 30 days		
Medical	58	33.5 (31.7 – 35.2)
Non-medical	29	17.8 (16.3 – 19.3)
Both medical and non-medical	80	48.8 (46.9 – 50.7)
Interest in quitting cannabis – mean (SD)	1.8 (1.9)	--
Interest in reducing cannabis – mean (SD)	1.9 (2.0)	--

Notes: 3 respondents did not answer cannabis items and were excluded from estimates above (n=1033). Current cannabis use was defined as either answering yes to a current cannabis use item (n=148) OR use within the past 30 days (n=165). Quit/reduction interest questions were on a 1–10 scale (1=not at all interested; 10=extremely interested). Abbreviations: CI Confidence Interval; dx=cancer diagnosis; THC= tetrahydrocannabinol; CBD= cannabidiol;

*=Check all that apply.

‡Suppositories were re-categorized into "Apply" when endorsed.

†Options 10–14 and 15–19 times a day were not endorsed and are not shown here. *p*-values are from weight-adjusted Chi-square tests.