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Impact of Healthcare Provider Awareness and Guidance on the Medical Cannabis Experience

Thomas A. Clobes[a] Marshall M. Mee[b] Jenna M. Jimenez[b]
Jesus Maldonado[b] Joshua R. Song[c]

[a]Department of Health Sciences, California State University Channel Islands, Camarillo, CA, USA; [b]Department of Psychology, California State University Channel Islands, Camarillo, CA, USA; [c]Castaic High School, Castaic, CA, USA

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Abstract
Introduction: Cannabis as a therapeutic agent is accessible to a growing number of people, though research suggests that many medical cannabis (MC) users undertake their cannabinoid therapy independently, without collaborating with a cannabis clinician or informing their primary care provider (PCP). The effects of medical collaboration or disclosure to PCP on outcomes of cannabinoid therapy are unknown. Researchers anticipate that those who collaborate with a cannabis clinician or disclose their medical cannabis use to their PCP will find MC to be more effective, use less delta-9-tetrahydrocannabinol (THC) and more cannabidiol (CBD), and experience fewer side effects. ***Methods:*** Through an online survey, medical cannabis users reported their cannabis usage patterns, health outcomes, PCP awareness, and collaboration with cannabis clinicians. These responses were analyzed using a variety of statistical tests to search for differences in reported efficacy, specific cannabinoid, and side effects between different levels of medical professional involvement (n = 988). ***Results:*** Patients who either worked with a cannabis clinician or reported their use of their PCP reported significantly higher efficacy ($p < 0.001$), and in the case of working specifically with a cannabis clinician, higher daily doses of cannabidiol were used ($p < 0.001$). CBD doses did not vary between those who had disclosed their MC use to their PCP and those who had not. There were no significant differences in THC doses or side effects identified between groups. ***Conclusion:*** The results indicated that undertaking cannabinoid therapy with PCP awareness or guidance from a cannabis clinician is associated with better outcomes.

Introduction

As the legal landscape of recreational and medical cannabis (MC) has evolved in the USA [1], both academics and consumers have increasingly desired to gain an understanding of the efficacy of cannabinoid therapies. Despite growing research fostered by legalization for medical purposes in 38 states, three territories, and the District of Columbia [1], relatively little research has been undertaken focusing on the significance of receiving guidance from

karger@karger.com
www.karger.com/mca

Correspondence to:
Jesus Maldonado, jesus.maldonado277@myci.csuci.edu

medical practitioners, as opposed to independently navigating cannabinoid treatment. Prior researchers showed a lack of medical professional collaboration and awareness in many individuals' cannabinoid therapies [2, 3], but little research has been conducted evaluating how this affects patients' health outcomes.

Previous researchers have demonstrated low rates of patient collaboration with trained healthcare professionals for MC usage [2], as well as reliance on dispensary staff who may not have formal cannabis training [2, 4]. Researchers in Michigan conducting a survey of dispensary customers found that only 24% of MC customers used cannabis on the suggestion of their primary care provider (PCP), with 64% electing to undertake cannabinoid therapy based upon their own knowledge [3]. Of 472 surveyed in another project, 78% stated they acquired knowledge from their personal experiences, 39% received information from the internet, and only 18% received information from their PCP [2]. However, those who reported obtaining MC information from their PCP performed better on questions regarding cannabis's medical applications.

Over the past few decades, delta-9-tetrahydrocannabinol (THC) concentration in popular cannabis strains has grown significantly, from <2% in the 1990s to over 17% by 2017 and more recent analyses reporting concentrations over 30% [5, 6]. Inversely, cannabidiol (CBD) concentrations have decreased due to selective breeding for THC [5]. This recreational-user-driven increase in THC concentration has correlated with an increase in adverse effects among cannabis users [5]. High-THC concentration cannabis products are also marketed toward medical users, despite their potentially decreased efficacy and higher risk of adverse outcomes due to the biphasic properties of THC [5, 7, 8]. This loss of CBD in many popular strains is unfortunate due to the medicinal benefits of CBD itself and the suggested synergistic effect of all the chemical constituents of cannabis, known as the entourage effect [9, 10].

These studies reveal a significant number of MC users who undertake their cannabinoid therapies without guidance from a cannabis clinician or disclosing their use to their PCP and who subsequently may carry out their cannabinoid therapies with a poor understanding of the technical realities of cannabis and its health effects. Cannabis users may also turn to dispensary staff and other nonmedical sources for information regarding how to carry out their cannabinoid therapy, sources which may not provide an in-depth understanding of the medical applications of cannabis. Additionally, many cannabis consumers use cannabis products with concentrations of THC which may expose them to increased risk of adverse effects and diminished medicinal benefits [7]. In light of this, it is essential to understand how therapeutic usage patterns and health outcomes can vary depending upon the presence or absence of cannabis clinicians or PCP awareness.

This study surveyed respondents using MC for a variety of ailments to evaluate the impact of medical guidance or PCP awareness on perceived cannabinoid therapy efficacy, average daily THC and CBD doses, side effects, and other usage patterns. Understanding the provider-patient relationship is of great importance as MC is destigmatized and increasingly legalized [1, 11]. The purpose of this study was to determine whether MC patients who work with cannabis clinicians or disclose their MC usage to their PCPs have different outcomes or use different doses of THC and CBD in their treatments. The hypotheses guiding this research were that MC patients who collaborate with cannabis clinicians or disclose their cannabis use to their PCPs would have better outcomes, lower THC doses, and higher CBD doses.

Methods

This was a secondary analysis of survey data collected from current and past MC users; the original cross-sectional survey can be reviewed here [12]. The survey was developed by Deanna et al. [12] in collaboration with MC researchers, cannabis dispensary owners, and clinicians who work with MC patients. Current and past adult MC users were recruited through Innovate MR, a reputable company specializing in online market research and survey sampling, and offered an incentive determined by their agreement with Innovate MR. The only inclusion criteria were that participants (a) needed to be at least 18 years of age, (b) reside in the USA, and (c) use or have used cannabis for medical reasons. Each participant was asked between two and four attention-check questions, depending on how they responded to other questions, ensuring they were answering survey questions with intention; if they answered any of the questions incorrectly, they were omitted from the survey. The survey took approximately 20 min to complete.

MC users were self-identified and defined as those who currently or previously used cannabis to treat or aid with any medical issue, whether or not with a recommendation or supervision from a medical provider. For the purposes of this secondary analysis, the focus was on two questions: "regardless of having a medical card or not, was MC recommended to you by a licensed medical provider?" and "does your PCP, if not the provider who recommended cannabis, know about your MC use?" This separated MC users into groups for two separate analyses, comparing (a) those who are working with an MC healthcare professional to navigate their cannabinoid therapy and those who are not

and (b) those whose PCP is aware of their cannabis use and those whose PCP is unaware. This allowed determination of the association between working with a cannabis clinician, defined as licensed healthcare professional recommending cannabis therapy, or PCP awareness and relevant outcomes for MC patients.

Measures

Different variables from the original survey were analyzed in an effort to understand how collaboration with a cannabis clinician or disclosure of cannabis usage to one's PCP were associated with health outcomes, side effects, and usage patterns. The specific variables analyzed were current health status, route of administration, ailments treated, age of first MC use, advice-seeking frequency from cannabis dispensary staff, frequency of use, daily THC dose, daily CBD dose, perceived efficacy for primary ailment, side effects experienced, amount spent per month on cannabis therapies, cannabis's impact on physical and mental health, overall quality of life, perceived problems with cannabis use, and support for MC use from family and friends.

Current health status, advice-seeking frequency from cannabis dispensary staff, frequency of use, perceived efficacy, amount spent per month, impact on physical and mental health, quality of life, perceived problems, and support were all measured using a five-point Likert scale. For all of these, the lower end of the scale represented less of the construct, with a higher number indicating more of it. Route of administration was simply reported as the MC patient's preferred method of using cannabis; participants could indicate multiple forms of administration. Ailments treated were identified from a list of provided ailments, and participants could also indicate "other," which required additional information to be provided; participants were allowed to select multiple ailments. Age of first use was reported at the ratio level. To calculate THC and CBD doses, patients reported concentration details on the different products they used and doses were calculated using reported frequency and amount used per treatment session. Because THC and CBD concentrations were reported as a range rather than a specific value, the middle of each range was used. Side effects were reported on a nominal level with common choices offered for selection in the survey with the option to write in a side effect not listed.

Data Analysis

Researchers used a chi-square test of independence for nominal variables as this test allowed researchers to determine if there were significant variations in proportions of a given response across two categorical variables. This test was used extensively when comparing rates of various responses between respondents who did or did not collaborate with a cannabis clinician or disclose their MC use to their PCP. For analyses concerning continuous variables, researchers used either an independent samples *t* test or a nonparametric Mann-Whitney U test, as appropriate considering relevant assumptions. Both tests were chosen as a way to compare mean scores across two groups, such as mean efficacy between those who worked with a cannabis clinician and those who did not. These chosen tests all allowed for simple and statistically robust analyses that would reveal if the researcher's hypothesized differences in usage patterns and outcomes were reflected in the sample. Because a large number of statistical analyses were performed, a Bonferroni-corrected alpha level of 0.00125 (original alpha = 0.05) was used to control for the family-wise error rate. All tests were two-tailed, and effect size descriptions were identified using common parameters, as described by Cohen [13] and Rea and Parker [14]. SPSS version 29 was used to conduct these analyses. With the self-reported THC and CBD daily dose data, upon consultation with MC clinicians, the decision was made to exclude outliers exceeding 2,000 mg per day as likely erroneous (66 respondents for THC dose and 43 respondents for CBD were omitted). These participants were included in other analyses.

Ethical Review

Data were collected anonymously to protect the confidentiality of the participants. This project was reviewed and approved by the Institutional Review Board at California State University Channel Islands (approval IO5662). Participants electronically acknowledged a written informed consent.

Results

By the end of the survey process, 988 individuals throughout the USA submitted viable MC data. The majority of participants were female (64.6%, $n = 638$), followed by males (34.3%, $n = 339$) and nonbinary individuals (1%, $n = 10$). The average age of the participants was 41.4 years old (SD = 12.6) with an average age of first cannabis use at 27 years old. The majority of MC users in this survey were White (78.5%, $n = 776$) and African American (15.7%, $n = 155$). Additional demographic data are available in Table 1.

Most participants stated that their MC usage was based on recommendation from an MC clinician (55%, $n = 543$) rather than independent navigation of their MC therapy (45%, $n = 445$; Table 1). Moreover, 67.3% ($n = 665$) of participants disclosed their cannabis usage to their PCP, while 32.7% ($n = 323$) opted for nondisclosure (Table 1). While many primary ailments (Table 2) contributed to MC

Table 1. Demographics

	Provider recommendation status		PCP awareness status		Overall (n = 988)
	yes (n = 543)	no (n = 445)	yes (n = 665)	no (n = 323)	
Age, years					
Mean (SD)	39.7 (11.2)	43.4 (13.9)	41.1 (12.6)	41.9 (13.4)	41.1 (12.6)
Gender					
Female	336 (61.88%)	302 (67.87%)	407 (61.20%)	231 (71.52%)	638 (64.57%)
Male	203 (37.38%)	136 (30.56%)	252 (37.89%)	87 (29.94%)	339 (34.31%)
Non-binary	3 (0.55%)	7 (1.57%)	6 (0.90%)	4 (1.24%)	10 (1.01%)
Race/ethnicity					
White	426 (78.45%)	350 (78.65%)	520 (78.20%)	256 (79.26%)	776 (78.54%)
Black/African American	94 (17.31%)	61 (13.71%)	106 (15.94%)	49 (15.17%)	155 (15.69%)
Hispanic/Latino/a	84 (15.47%)	61 (13.71%)	103 (15.49%)	42 (13.00%)	145 (14.68%)
Native American	32 (5.89%)	20 (4.49%)	37 (5.56%)	15 (4.64%)	52 (5.26%)
Asian	12 (2.21%)	12 (2.70%)	16 (2.41%)	8 (2.48%)	24 (2.43%)
Native Hawaiians/Pacific Islanders	10 (1.84%)	5 (1.12%)	13 (1.95%)	2 (0.62%)	15 (1.52%)
Other	22 (4.05%)	20 (4.49%)	29 (4.36%)	13 (4.02%)	42 (4.25%)
Education					
No high school	3 (0.55%)	0 (0%)	2 (0.30%)	1 (0.31%)	3 (0.30%)
Some high school	12 (2.21%)	26 (5.84%)	20 (3.01%)	18 (5.57%)	38 (3.85%)
High school	133 (24.49%)	119 (26.74%)	164 (24.66%)	88 (27.24%)	252 (25.51%)
Some college	141 (25.97%)	131 (29.44%)	181 (27.22%)	91 (28.17%)	272 (27.53%)
Trade/vocational	40 (7.37%)	37 (8.31%)	56 (8.42%)	21 (6.50%)	77 (7.79%)
Associates	75 (13.81%)	50 (11.24%)	88 (13.23%)	37 (11.46%)	125 (12.65%)
Bachelor	90 (16.57%)	53 (11.91%)	101 (15.19%)	42 (13.00%)	143 (14.47%)
Masters	39 (7.18%)	27 (6.07%)	45 (6.77%)	21 (6.50%)	66 (6.68%)
Doctoral	10 (1.84%)	2 (0.45%)	8 (1.20%)	4 (1.24%)	12 (1.21%)

use in the survey population, the most notable were anxiety (22.8%, n = 225), chronic pain (21.4%, n = 211), insomnia (9.9%, n = 98), and depression (9.3%, n = 92). The most commonly reported routes of administration (Table 3) were smoking (71.4%), edibles (55.2%), and vaping (38.9%).

Cannabinoids

Delta-9-Tetrahydrocannabinol

Researchers investigated whether the amount of THC in milligrams per day differs between those who have had MC recommended by a licensed medical provider and those who have not. Levene's test for equality of variances was nonsignificant (p = 0.925); therefore, equal variances could be assumed. The daily dose of THC of individuals who had MC recommended by a licensed medical provider (M = 219.97, SD = 409.24) was not significantly different than the daily dose of THC of those who did not have MC recommended by a licensed medical provider (M = 202.19, SD = 406.35), t (736) = 0.546, p = 0.585, d = 0.044. For the grouping variable of PCP knowledge, Levene's test for equality of variances was nonsignificant, p = 0.466, indicating equal variances. The daily dose of THC of individuals whose PCP was aware of their MC use (M = 214.33, SD = 403.11) was not significantly different than the daily dose of THC of those whose PCP was not aware of their MC use (M = 215.25, SD = 430.59), t (736) = −0.024, p = 0.981, d = −0.002.

Cannabidiol

Differences in how many milligrams of CBD individuals use per day between those who do and do not have a provider recommendation to use MC were also explored. Levene's test for equality of variances was significant (p < 0.001); therefore, equal variances cannot be assumed, and a Mann-Whitney U test was run. Distributions of CBD quantity of those who do and do not have a provider recommendation to use MC were similar. The median CBD quantity for those who had a provider recommendation (17.67 mg) was statistically significantly higher than for those who did not have a provider recommendation (4.5 mg): U = 47,039.5, z = −4.715, p < 0.001, r = 0.203. This is a small

Table 2. Reported ailments treated with MC

	Provider recommendation status		PCP awareness status		Overall (n = 988)
	yes (n = 543)	no (n = 445)	yes (n = 665)	no (n = 323)	
Acute pain	18 (3.31%)	9 (2.02%)	18 (2.71%)	9 (2.79%)	27 (2.7%)
Alcohol or other drug use	125 (23.02%)	100 (22.47%)	151 (22.71%)	74 (22.91%)	225 (22.8%)
Anxiety	7 (1.29%)	9 (2.02%)	8 (1.20%)	8 (2.48%)	16 (1.6%)
Autoimmune diseases	47 (8.66%)	45 (10.11%)	51 (7.67%)	41 (12.69%)	92 (9.3%)
Chronic pain	12 (2.21%)	8 (1.80%)	16 (2.41%)	4 (1.24%)	20 (2%)
Depression	39 (7.18%)	59 (13.26%)	60 (9.02%)	38 (11.76%)	98 (9.9%)
Eating disorder	36 (6.63%)	24 (5.39%)	44 (6.62%)	16 (4.95%)	60 (6.1%)
Gastrointestinal disorders	18 (3.31%)	22 (4.94%)	23 (3.46%)	17 (5.26%)	40 (4%)
Insomnia	114 (20.99%)	97 (21.80%)	142 (21.35%)	69 (21.36%)	211 (21.4%)
Migraines	46 (8.47%)	18 (4.04%)	56 (8.42%)	8 (2.48%)	64 (6.5%)
Misc. psychiatric disorders	8 (1.47%)	2 (0.45%)	9 (1.35%)	1 (0.31%)	10 (1%)
Neurological disorders	36 (6.63%)	29 (6.52%)	44 (6.62%)	21 (6.50%)	65 (6.6%)
Other	25 (4.60%)	20 (4.49%)	32 (4.81%)	13 (4.02%)	45 (4.6%)
PTSD	9 (1.66%)	3 (0.67%)	9 (1.35%)	3 (0.93%)	12 (1.2%)
Schizophrenia	3 (0.55%)	0 (0.00%)	2 (0.30%)	1 (0.31%)	3 (0.3%)

Table 3. Routes of administration, provider recommendation, and PCP awareness

	Provider recommendation status		PCP awareness status		Overall (n = 988)
	yes (n = 543)	no (n = 445)	yes (n = 665)	no (n = 323)	
Beverages	75 (13.81%)	37 (8.31%)	87 (13.08%)	25 (7.74%)	11.34%
Concentrate	110 (20.26%)	64 (14.38%)	133 (20.00%)	41 (12.69%)	17.61%
Edibles	309 (57.09%	234 (52.81%)	385 (57.89%)	158 (48.92%)	54.96%
Home-made food products	111 (20.44%)	63 (14.16%)	130 (19.55%)	44 (13.62%)	17.61%
Other	0 (0.00%)	2 (0.45%)	0 (0.00%)	2 (0.62%)	0.20%
Smoking	415 (76.43%)	317 (71.24%)	513 (77.14%)	219 (67.80%)	74.09%
Tinctures	94 (17.31%)	44 (9.89%)	106 (15.94%)	32 (9.91%)	13.97%
Topicals	95 (17.50%)	63 (14.16%)	113 (16.99%)	45 (13.93%)	15.99%
Vaping	226 (41.62%)	157 (35.28%)	261 (39.25%)	122 (37.77%)	38.77%

effect size. For the grouping variable of PCP knowledge, Levene's test for equality of variances was nonsignificant, p = 0.206, indicating equal variances. The daily dose of CBD of individuals whose PCPs are aware (M = 124.57, SD = 281.39) was not significantly different than the daily dose of CBD of those whose PCPs are not aware (M = 97.43, SD = 246.4), t (749) = 1.055, p = 0.292, d = 0.099.

Side Effects

Analyses were conducted to investigate whether having a recommendation to use MC and whether an individual's PCP is aware of their MC use impacts whether or not an individual experiences side effects. Individuals without a recommendation experienced side effects at the same rate as those with a recommendation χ^2 (1, n = 987) = 0.01, p = 0.921, φ_c = 0.003. Likewise, those who did not have a PCP who was aware of their MC use experienced side effects at the same rate as those who had a PCP who was aware of their MC use, χ^2 (1, n = 987) = 0.01, p = 0.921, φ_c = 0.003. In addition to investigating whether individuals experience side effects, analyses were conducted to determine if the specific side effects that individuals experience were different between those who do and do not have a recommendation to use MC, and between those whose PCPs are and are not aware of their MC use. The type of side effects that individuals experience did not differ between the groups of those who had a recommendation and those who did not, χ^2 (8, n = 3,628) = 9.57, p = 0.297, φ_c = 0.051, and did not differ between the groups of those whose PCPs were and were not aware of their MC use, χ^2 (8, n = 3,628) = 7.399, p = 0.494, φ_c = 0.045.

Perceived Efficacy

Analyses were run to investigate how effective MC was at providing symptom relief between those who do and do not have a provider recommendation to use MC. Participants were asked to rate how well MC relieved the symptoms of their primary ailment, from 1, no symptom relief, to 5, a great deal of symptom relief. Levene's test for equality of variances was significant ($p < 0.001$); therefore, equal variances cannot be assumed, and a Mann-Whitney U test was conducted. Distributions of symptom relief by those who do and do not have a provider recommendation to use MC were similar. Illustrated in Figure 1, the symptom relief of those who had a provider recommendation (mean rank = 537.97) was statistically significantly higher than for those who did not have a provider recommendation (mean rank = 441.45), U = 97,211.5, z = −5.545, $p < 0.001$, r = 0.18 (shown in Fig. 1). This is a small effect size.

Additionally, an investigation into the differences in how effective MC was at providing symptom relief of one's primary ailment between those whose primary care providers are and are not aware of their MC use was conducted, and is depicted in Figure 2. Levene's test for equality of variances was significant ($p < 0.001$); therefore, equal variances cannot be assumed, and a Mann-Whitney U test was run. Distributions of efficacy by those whose primary care providers are and are not aware of their MC use were similar. The efficacy of MC for those whose primary care providers were aware of their MC use (mean rank = 523.74) was statistically significantly higher than for those whose primary care providers were unaware of their MC use (mean rank = 434.29), U = 87,950, z = −4.845, $p < 0.001$, r = 0.15 (shown in Fig. 2). This is a small effect size.

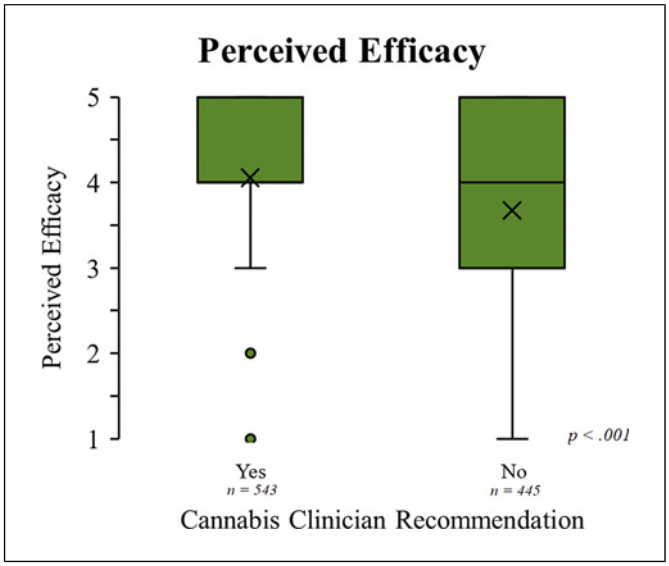

Fig. 1. Reported overall efficacy between those who worked with a cannabis clinician (n = 543) and those who had not (n = 445). Statistical significance determined via the Mann-Whitney U test (mean rank = 441.45): U = 97,211.5, z = −5.545, $p < 0.001$, r = 0.18.

Table 4 shows the reported rates of side effects experienced during the course of MC therapy. In Table 5, the findings for frequency of use are provided. Tables 6 and 7 contain the findings for numerous other analyses regarding other variables examined in the survey for MC recommendation and PCP awareness, respectively. These results further illustrate various facets of cannabinoid therapy and how it differs between those with different levels of clinician involvement.

Discussion

An analysis of the health outcomes between those with cannabis clinician guidance or PCP knowledge demonstrates the importance of MC patients working with clinicians to guide their cannabinoid treatment. MC patients who received cannabis guidance or informed their PCP of MC use experienced greater

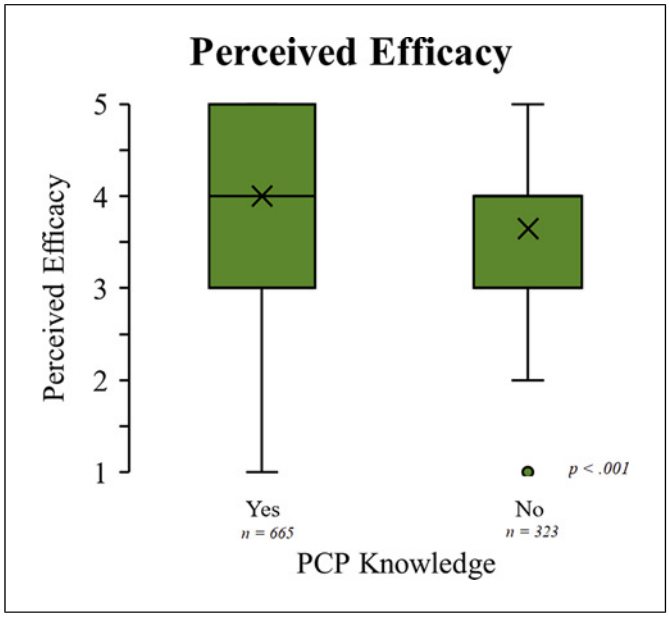

Fig. 2. Reported overall efficacy between those who had informed their PCP (n = 665) and those who had not (n = 323). Statistical significance determined via the Mann-Whitney U test (mean rank = 434.29): U = 87,950, z = −4.845, p < 0.001, r = 0.15.

symptom relief in treating their respective ailments. This is despite similar current health statuses between all groups. Those working with a cannabis clinician reported MC having greater benefits for their physical and mental health. Likewise, those who had informed their PCP also reported better mental and physical effects. These findings support the hypothesis that undertaking cannabinoid therapy with medical guidance or PCP awareness may lead to more effective treatment. There was no significant variation in either groups' type or frequency of side effects, although this is unsurprising considering the similar average daily doses of THC between both groups.

Additionally, the usage patterns of those working with a cannabis clinician or who had informed their PCP of their MC use varied meaningfully as well. As predicted by the hypothesis, in multiple key criteria, MC patients collaborating with a cannabis clinician reported more medically oriented usage patterns**.** The same was true for those who informed their PCP of using MC. For the purpose of this discussion, medically oriented usage patterns are defined as usage choices made specifically to maximize therapeutic efficacy and minimize adverse effects. It was predicted that those working with a clinician would use higher daily doses of CBD and lower daily doses of THC. These usage pattern predictions were partially correct: Those working with a cannabis clinician were more likely to use higher amounts of CBD, although there was no statistically significant variation in average daily THC doses. This is consistent with prior research in which cannabis clinicians have emphasized the importance of CBD in cannabinoid therapy [15] due to its limited side effects [16] and to complement THC use [17]. It was expected that there would be other significant findings supporting the notion that working with a cannabis clinician or informing a PCP of MC usage encourages more medically oriented usage patterns, such as being more likely to use tinctures as a route of administration. While this was not observed in this study, prior research has emphasized the possible negative health effects of inhaled cannabis [18–20], and the slow uptake of ingested cannabis [21], leading to a clinician preference for sublingual ingestion of cannabis [15]. This research project also found that Individuals working with clinicians also used cannabis more frequently and spent more on it per month. This is possibly due to those with more severe ailments being more likely to seek out guidance for their cannabinoid therapy.

Others' views of a patient's MC use are affected by the patient's obtaining a medical recommendation or notifying their PCP. Those who undertook cannabinoid therapy on the recommendation of a cannabis clinician, or notified their PCP of their MC use, reported their friends and family having a more positive perception of their cannabis use. However, there were no statistically significant differences in how those with or without medical guidance or PCP communication viewed their own usage. Possessing a medical recommendation, or at least informing one's PCP of MC use, seems to impart a level of credibility in the eyes of others.

Limitations

Survey responses were self-reported, potentially resulting in limitations in response accuracy. This problem is compounded by the fact that some questions were about illegal activity, such as acquiring cannabis illicitly, depending on the respondent's location of residence. However, this was mitigated by using a confidential survey collection and not collecting personally identifiable information or internet protocol addresses. Additionally, given that this was not an experimental project, there was no control group to measure how others with similar ailments reported the impact of noncannabinoid therapies. For example, while comparisons were made on the self-reported

Table 4. Routes of administration and side effects with provider recommendation and PCP awareness status

Route of administration	Side effects	Provider recommendation status		PCP awareness status		Overall (n = 988)
		yes (n = 543)	no (n = 445)	yes (n = 665)	no (n = 323)	
Smoking		415 (76.4%)	317 (71.2%)	513 (77.1%)	219 (67.8%)	732 (74.1%)
	Dry mouth	214 (39.4%)	158 (35.5%)	265 (39.8%)	107 (33.1%)	372 (37.7%)
	Increased appetite	196 (36.1%)	155 (34.8%)	249 (37.4%)	102 (31.6%)	351 (35.5%)
	None	101 (18.5%)	84 (18.9%)	127 (19.1)	61 (18.9%)	188 (19.0%)
Vaping		226 (41.6%)	157 (35.3%)	261 (39.2%)	122 (37.8%)	383 (38.8%)
	Dry mouth	80 (14.7%)	54 (12.1%)	98 (14.7%)	36 (11.1%)	134 (13.6%)
	Increased appetite	76 (14.0%)	50 (11.2%)	90 (13.5%)	36 (11.1%)	126 (12.8%)
	None	84 (15.5%)	57 (12.8%)	89 (13.4%)	52 (16.1%)	141 (14.3%)
Concentrate		110 (20.3%)	64 (14.4%)	133 (20.0%)	41 (12.7%)	174 (17.6%)
	Dry mouth	41 (7.6%)	22 (4.9%)	51 (7.7%)	12 (3.7%)	63 (6.4%)
	Increased appetite	44 (8.1%)	20 (4.4%)	55 (8.3%)	9 (2.8%)	64 (6.5%)
	None	35 (6.4%)	26 (5.8%)	41 (6.2%)	20 (6.2%)	61 (6.2%)
Edibles		309 (56.9%)	234 (52.6%)	385 (57.9%)	158 (48.9%)	543 (55.5%)
	Dry mouth	69 (12.7%)	43 (9.7%)	78 (11.7%)	34 (10.5%)	112 (11.3%)
	Increased appetite	93 (17.1%)	57 (12.8%)	111 (16.7%)	39 (12.1%)	150 (15.2%)
	None	146 (26.9%)	100 (22.5%)	178 (26.8%)	68 (21.2%)	246 (24.9%)
Home-made food products		111 (20.4%)	63 (14.2%)	130 (19.5%)	44 (13.6%)	174 (17.6%)
	Dry mouth	25 (4.6%)	16 (3.6%)	33 (5.0%)	8 (2.5%)	41 (4.1%)
	Increased appetite	35 (6.4%)	23 (5.2%)	47 (7.1%)	11 (3.4%)	58 (5.9%)
	None	49 (9.0%)	27 (6.1%)	52 (7.8%)	24 (7.4%)	76 (7.7%)
Tinctures		94 (17.3%)	44 (9.9%)	106 (15.9%)	32 (9.9%)	138 (14.0%)
	Dry mouth	21 (3.9%)	7 (1.6%)	21 (3.2%)	7 (2.2%)	28 (2.8%)
	Increased appetite	23 (4.2%)	9 (2.0%)	25 (3.8%)	7 (2.2%)	32 (3.2%)
	None	47 (8.7%)	28 (6.3%)	58 (8.7%)	17 (5.3%)	75 (7.6%)
Topicals		95 (17.5%)	63 (14.2%)	113 (17.0%)	45 (13.9%)	158 (16.0%)
	Dry mouth	10 (1.8%)	3 (0.7%)	12 (1.8%)	1 (0.3%)	13 (1.3%)
	Increased appetite	10 (1.8%)	5 (1.1%)	13 (2.0%)	2 (0.6%)	15 (1.5%)
	None	76 (14.0%)	53 (11.9%)	88 (13.2%)	41 (12.7%)	129 (13.1%)
Beverages		75 (13.8%)	37 (8.3%)	87 (13.1%)	25 (7.7%)	112 (11.3%)
	None	45 (8.3%)	21 (4.7%)	52 (7.8%)	14 (4.3%)	66 (6.7%)
	Anxiety	12 (2.2%)	9 (2.0%)	14 (2.1%)	7 (2.2%)	21 (2.1%)
	Increased appetite	15 (2.8%)	7 (1.6%)	19 (2.9%)	3 (0.9%)	22 (2.2%)
Other		0	2 (0.4%)	0	2 (0.6%)	2 (0.2%)
	None	0	1 (0.2%)	0	1 (0.3%)	1 (0.1%)
	Anxiety	0	1 (0.2%)	0	1 (0.3%)	1 (0.1%)
	Paranoia	0	1 (0.2%)	0	1 (0.3%)	1 (0.1%)
	Unwanted drowsiness	0	1 (0.2%)	0	1 (0.3%)	1 (0.1%)

efficacy, it is unknown how similar patients using other treatment options would have evaluated their efficacy. As with all surveys, there is also the possibility of respondents not reading questions thoroughly, although this was controlled for via multiple attention check questions.

A notable weakness of this study was due to smaller n counts for certain ailments. Analyses looked at efficacy as a composite rather than by individual ailment. While most ailment options included in the survey had large enough n counts for individual analysis, some ailments did not. Subsequently, it was decided for ailments to be grouped together to obtain a composite efficacy score. Analyses were done on this composite score, ignoring possible variation in how effective MC was for different ailments. The effects of this are most likely minimal but

Table 5. Frequency of cannabis use with provider recommendation and PCP awareness status

	Provider recommendation status		PCP awareness status		Overall (n = 988)
	yes (n = 543)	no (n = 445)	yes (n = 665)	no (n = 323)	
Less than once a month[a]	38 (7.00%)	113 (25.39%)	54 (8.12%)	97 (30.03%)	151 (15.3%)
Monthly	70 (12.89%)	47 (10.56%)	82 (12.33%)	35 (10.84%)	117 (11.8%)
Weekly	128 (23.57%)	103 (23.15%)	157 (23.61%)	74 (22.91%)	231 (23.4%)
Daily[a]	177 (32.60%)	114 (25.62%)	212 (31.88%)	79 (24.46%)	291 (29.5%)
Multiple times a day[a]	130 (23.94%)	68 (15.28%)	160 (24.06%)	38 (11.76%)	198 (20.0%)

[a]Values that are significantly different on a $p < 0.001$ level.

Table 6. Comprehensive provider recommendation results

Analysis	Provider recommendation status		Significance, p value
	yes (n = 665)	no (n = 323)	
Health and quality of life			
Overall current health status	M = 3.53, SD = 0.91	M = 3.48, SD = 0.87	0.408
Overall mental health impact	M = 4.32, SD = 0.83	M = 3.94, SD = 0.92	<0.001*
Mental health impact: psychological ailments	Mean rank = 326.71	Mean rank = 247.21	<0.001*
Overall physical health impact	Mean rank = 535.95	Mean rank = 443.92	<0.001*
Physical health impact: physical ailments	M = 4.24, SD = 0.772	M = 4.01, SD = 0.878	0.005
Quality of life	M = 3.57, SD = 0.92	M = 3.52, SD = 0.90	0.405
Usage patterns			
Age of first use	Median: 25 years old	Median: 21 years old	0.042
Monthly cost	M = 2.68, SD = 1.087	M = 2.10, SD = 1.119	<0.001*
Advice-seeking frequency	Median = 3	Median = 2	<0.001*
Cannabinoids			
THC	M = 219.97, SD = 409.24	M = 202.19, SD = 406.35	0.585
CBD	Median = 17.67 mg	Median = 4.5 mg	<0.001*
Perceptions of use			
Personal perception: problematic usage	Median = 1	Median = 1	0.087
Social perception: problematic usage	Mean rank = 511.67	Mean rank = 473.55	0.007
Social perception: support	Median = 4	Median = 3	<0.001*
Outcomes			
Perceived efficacy	Mean rank = 537.97	Mean rank = 441.45	<0.001*

are worth noting when considering the efficacy score used for analysis. The cross-sectional nature of this project is an additional limitation as no data on understanding patients' cannabinoid therapy over an extended time period were collected.

Although data were collected throughout the USA, variable legal status could have influenced MC users from disclosing their MC use to their PCP or choosing to work with a cannabis clinician. Potentially, some MC patients' experiences were more consistent with those whose PCPs were aware or with clinical guidance but were grouped otherwise for this analysis simply due to influence from their state's legal status. Despite understanding the value of cannabinoid therapy for treating their ailments, survey respondents would have to rely on their own research, and they may have been

Table 7. Comprehensive PCP awareness results

Analysis	PCP awareness		Significance
	yes (n = 665)	no (n = 323)	
Health and quality of life			
Overall current health status	M = 3.52, SD = 0.89	M = 3.50, SD = 0.89	0.736
Overall mental health impact	M = 4.27, SD = 0.87	M = 3.91, SD = 0.89	<0.001*
Mental health impact: psychological ailments	M = 4.3, SD = 0.902	M = 3.96, SD = 0.916	<0.001*
Overall physical health impact	M = 4.21, SD = 0.83	M = 3.81, SD = 0.90	<0.001*
Physical health impact: physical ailments	M = 4.26, SD = 0.787	M = 3.88, SD = 0.856	<0.001*
Quality of life	M = 3.57, SD = 0.89	M = 3.48, SD = 0.94	0.126
Usage patterns			
Age of first use	22 years old	24 years old	0.194
Monthly cost	Mean rank = 548.99	Mean rank = 382.31	<0.001*
Advice-seeking frequency	M = 2.62, SD = 1.183	M = 2.05, SD = 1.175	<0.001*
Cannabinoids			
THC	M = 214.33, SD = 403.11	M = 215.25, SD = 430.59	0.981
CBD	M = 124.57, SD = 281.39	M = 97.43, SD = 246.4	0.292
Perceptions of use			
Personal perception: problematic usage	Median = 1	Median = 1	0.252
Social perception: problematic usage	Median = 1	Median = 1	0.063
Social perception: support	M = 3.66, SD = 1.31	M = 3.08, SD = 1.36	<0.001*
Outcomes			
Perceived efficacy	Mean rank = 523.74	Mean rank = 434.29	<0.001*

*A statistically significant result.

prevented from discussing their usage with a medical professional. Additionally, some people may have chosen not to participate in the project because of fear of potential legal ramifications.

Another limitation of this study is the lack of a clear definition of the term cannabis clinician. The survey only asked respondents if their cannabis use was recommended by a licensed medical professional and not what the clinician's cannabis qualifications may have been. Survey respondents may not have had a clear understanding of what was meant by cannabis clinician and, therefore, may not know if they have met with one. There may have also been a wide range of professional experiences and cannabis education levels represented among the cannabis clinicians' respondents reported working with. Additionally, it is possible that those who worked with cannabis clinicians did so due to prior success with cannabis. This may have been a factor in the better outcomes reported by those who worked with cannabis clinicians. Causality cannot be determined from this project. Future research could address these concerns, and dive deeper into how these findings relate to specific ailments.

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Statement of Ethics

This project was reviewed and approved by the Institutional Review Board at California State University Channel Islands (approval IO5662) and participants electronically acknowledged a written informed consent.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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The funder had no role in the design, data collection, data analysis, and reporting of this study.

Author Contributions

T.A.C. conceived of the project, designed it, collected data, and analyzed the data. M.M.M., J.M.J., J.M., and J.R.S. participated in the data analysis. All authors contributed equally to writing, reading, and approving the final manuscript.

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due the sensitive nature of the topic but are available from the corresponding author on reasonable request.

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