



Mixed methods study of the potential therapeutic benefits from medical cannabis for patients in Florida

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ABSTRACT

Objectives: To evaluate medical marijuana patients' perceptions of therapeutic benefits for self-reported medical conditions.

Design: The study was a concurrent mixed methods study with adult medical marijuana patients. Survey data were collected using a web-based survey, and interviews were conducted in person or over the phone.

Setting: The study recruited 196 medical marijuana patients to complete surveys and 13 patients to participate in qualitative interviews in Florida.

Measures: A validated patient survey was distributed via Florida medical marijuana social media groups to examine the therapeutic benefits of the cannabis plant for medical conditions and overall well-being. Concurrently, qualitative interviews were conducted to understand barriers and facilitators to accessing medical cannabis and explore preferences for different forms and strains, as well as any unexpected side effects.

Results: Patients used medical cannabis for relief of chronic pain or depression, followed by arthritis and nausea. Survey results indicated 89 % of patients reported "great relief" for their medical condition. Over 76 % of patients reported a score of 8 or higher on a 10-point scale that their medical condition had improved, and over 68 % reported a score of 8 or higher that medical cannabis had reduced their pain. Interviews indicated medical cannabis was effective for pain relief and reducing the use of prescription medicines, but the drug was perceived as too expensive.

Conclusions: Medical marijuana patients were positive about the health benefits they received and the fact they were able to reduce or eliminate many prescription medications; however, there were concerns about the costs.

1. Introduction

Medical cannabis is now available as a treatment option for patients in more than half the states in the United States but remains classified by the federal government as a Schedule 1 drug, meaning it has no accepted medical uses. Despite this classification, patients use medical cannabis to address medical conditions. A systematic review and meta-analysis reported medical cannabis might be effective for chronic pain treatment, especially for neuropathic pain patients.¹ However, a Cochrane review revealed that patients with chronic neuropathic pain were only able to decrease pain by as much as 30 % with medical cannabis, and potential harms of the treatment might outweigh potential benefits.² A clinical study of medical marijuana patients in New Jersey reported patients experienced increased quality of life and decreased pain.³ For these patients, the most common reasons for receiving treatment with

medical cannabis were intractable skeletal spasticity, chronic pain, multiple sclerosis, and inflammatory bowel disease.⁴

Despite the lack of consensus by providers on recommendations, patients continue to use medical cannabis as part of their treatment for chronic pain and other medical conditions.⁵ However, the conflicting recommendations encountered by patients consulting with medical providers creates confusion and frustration for patients seeking medical advice on recommended use.⁶ Healthcare professionals should keep current with recommended uses of medical cannabis to help their patients.⁷

To date, few studies have characterized the demographic characteristics of medical marijuana patients. Studies reported that use of medical cannabis is more common among non-Hispanic whites than among minority populations and foreign-born individuals in the U.S.^{8,9} Additionally, lower socioeconomic status, stigma, and physician

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preferences have been associated with lower likelihood of usage.^{9,10} Conversely, use of medical cannabis is more common among people of higher socioeconomic status with disposable income who have the advantages of stable employment and employer-provided health insurance.⁹

With increased decriminalization of cannabis in different states and the existence of varied state-specific policies, patients' access, attitudes, and beliefs toward cannabis use is influenced by their own state's policy. Florida is a recent example of this trend. Under Florida law, qualified providers are permitted to recommend medical cannabis to patients with diseases like cancer or conditions like epilepsy that cause seizures if there are no alternative treatment options available. To be qualified in Florida, first, patients need to provide a qualified provider with their medical records indicating their qualifying condition to be evaluated. Typically, many of these qualified providers are practicing in medical marijuana treatment center offices. Next, patients apply for their medical card with the Office of Medical Marijuana Use and pay the fee before they can visit a marijuana dispensary to purchase the product. Medical Marijuana Use Registry identification cards were first issued to Florida patients in February 2017. According to the Florida data, medical cannabis is currently being used primarily for pain management.¹¹

To better understand therapeutic benefits for patients and barriers and facilitators to access, a mixed methods study was conducted. This study contributes to the literature on patient perspectives of the benefits of cannabis for medical conditions and on the implementation of the medical marijuana program in Florida.

1.1. Objective

The study had two primary objectives: (1) to understand factors driving health seeking decisions for the use of medical cannabis by patients; and (2) to evaluate perceived therapeutic benefits of medical cannabis and whether these benefits differed by age, race, or gender. To address the first objective, the researchers sought to identify multiple medical reasons patients chose to use medical cannabis to address their health conditions. To address the second objective, the researchers examined differences by age, race, and gender for perceived benefits, such as pain relief, nausea relief, and increased appetite.

2. Methods

2.1. Surveys

The research team first distributed paper surveys in a Tallahassee medical marijuana treatment center. This method yielded less than 20 surveys, so in order to reach the survey goal of 200, the researchers adjusted their recruitment plan to extend the pool of potential participants to the entire state of Florida using postings to Facebook groups for medical marijuana patients. The patient survey was an adapted version of a previously validated patient survey to collect data on the therapeutic benefits of medical cannabis for pain alleviation, overall well-being, and other beneficial effects in a diverse patient population.³ In addition, the patient survey queried whether the use of medical cannabis reduced the use of other pain medications. The survey recruited 196 participants. Patients were randomly selected to receive grocery store gift cards for their participation.

2.2. Interviews

The interview questions were similar to the survey questions with more opportunities for open-ended responses. The researchers conducted qualitative interviews with a small sample of patients to understand barriers and facilitators to accessing medical cannabis and explore preferences for different forms and strains of medical cannabis (e.g., edibles, oils, etc.), as well as any perceived or actual drug interaction effects or unpleasant side effects.

The researchers first recruited six participants in Tallahassee using flyers at medical marijuana treatment centers and vape shops. Next, the researchers recruited seven additional survey participants who shared their contact information to also participate in a telephone interview given slow in-person recruitment and the recruitment challenges presented by the coronavirus pandemic. All 13 interviews were recorded and transcribed. MAXQDA Version 2018 (Marburg, Germany) was used to code the qualitative data using content codes based on each question and creating subcodes for question areas such as symptoms or health conditions. For example, there were parent codes based on health conditions, use of prescription medications, and patterns of use. Two coders read all the transcripts and came to agreement on the codebook and code definitions. For each code category, exemplary quotes were selected to illustrate key points in the findings. Interview participants received a \$20 grocery store gift card for study participation. The study protocol was approved by the Florida A&M University Institutional Review Board.

3. Results

3.1. Survey demographics

A total of 196 participants completed the survey. The age of survey respondents ranged from 19 to 77 years old with an average age of 47. There were more female respondents (69 %) than male respondents (31 %). In terms of race/ethnicity, most survey respondents were white (87 %), followed by Black/African American (6%), Hispanic (6%), and Asian (2%). The median household income was between \$41,000 and \$60,000 per year. Fifty-nine (34 %) respondents reported that they currently smoked tobacco cigarettes. Regarding tobacco use, 34 % reported being smokers and 8% mixed tobacco and cannabis (Table 1).

3.2. Effect of medical Cannabis to help manage medical conditions and potential benefits

Respondents reported that medical cannabis either provided a little relief (11 %) or great relief (89 %) for their medical condition based on a 5-point scale. As a follow-up, respondents explained that medical marijuana improved their condition related to reducing anxiety, eliminating opioid use, improving sleep, addressing post-traumatic stress disorder (PTSD), improving pain management, and stimulating appetite. For example, to help with anxiety one participant responded, *"I have anxiety, it calms that. I have arthritis, it eases the stiffness. I have incredible knee pain that makes it hard to sleep and it really helps me to fall asleep. It*

Table 1
Demographic Characteristics of Sample (N = 196).

Demographic	
Age (years), <i>M</i> (<i>SD</i>)	47.6 (13.4)
Gender, <i>N</i> (%)	
Male	61 (31 %)
Female	133 (69 %)
Race, <i>N</i> (%)	
Black/African American	12 (6%)
Asian	4 (2%)
Native Hawaiian/Pacific Islander	1 (1%)
Other	8 (4%)
White	170 (87 %)
Ethnicity, <i>N</i> (%)	
Hispanic	11 (6%)
Non-Hispanic	177 (94 %)
Annual Income, <i>N</i> (%)	
Less than \$20,000	30 (16 %)
Between \$21,000 and \$40,000	60 (31 %)
Between \$41,000 and \$60,000	42 (22 %)
Between \$61,000 and \$80,000	20 (11 %)
Between \$81,000 and \$100,000	13 (7%)
Over \$100,000	28 (15 %)

even seems to ease my depression.” Other participants frequently cited reduction in opioid use. For example, one participant wrote, “Medical marijuana gives me the relief I need without the horrible side effects of opioids. I can actually function now.” Pain was also frequently discussed. One participant explained, “Marijuana has improved my life greatly. My pain was regularly in the 8–9 score. Now, most days I’m around a 4–5 following use. I can do more, go more places, and just take part in life better than before. It has greatly improved my quality of life.”

Another question asked participants to respond to questions regarding benefits of medical cannabis based on a 10-point scale (Table 2). The results indicated participants reported their overall condition improved, with greatest improvements for increased mood, improved quality of life, and decreased pain. Black/African Americans reported higher satisfaction with the effects of medical cannabis compared to whites for the following indicators: increased appetite, decreased seizures, and increased energy ($p < 0.05$). Compared to men, women had a lower score for the benefit of decreased seizures ($Rho = -0.21$). A higher median yearly household income was correlated with a lower score for the benefit of increased energy ($Rho = -0.14$) and improved general condition ($Rho = -0.18$). Age was negatively correlated with all potential benefit indicators, except decreased intraocular pressure and decreased spasms. Nevertheless, older patients still maintained high summative scores for potential benefits, e.g., for age 50–59 years old, the mean was 78.8 (SD = 19.2) and for age ≥ 60 years old, the mean was 79.5 (SD = 18.1).

3.3. Usage patterns

There was variability in daily usage of medical cannabis. Usage patterns varied to include: once a day (10 (5%)), 2–3 times a day (59 (30%)), 4–5 times a day (42 (21%)), and greater than or equal to 6 times a day (46 (24%)). In terms of administration, vape was the most common, also referred to as inhalation. Other forms included flower, topical, concentrate, tinctures, edibles, pills, oil, and dabbing (i.e., inhalation of concentrated vapor). The “flower” method refers to smoking, but other usage methods include using sublingual drops or eating edible baked goods. Some other answers related to usage preference included: “all but tincture” “distillate” “suppositories” “rosin, shatter” “RSO” “Oil vape carts, vaporizing shatter/crumble/rosin, vaporizing whole flower, smoking whole flower, or oral distillate.” Most reported that either vaping or smoking as a joint were the most effective ways to receive the drug, followed by smoked through a pipe or a waterpipe. In response to strain preferences, Cannabis indica and Cannabis sativa were commonly mentioned, and

one specific variety called “9-pound hammer” was mentioned frequently. This variety is a strain of Cannabis indica with a high level of THC averaging from 18 to 23%.¹² According to the Florida Dispensary website, the variety is helpful for insomnia and appetite, but some users report headaches.¹² There was variation in length of time that patients had been using medical cannabis, with 36 % reporting one to two years, 31 % two to five years, 17 % less than one year, and 16 % for over 5 years. The major barrier to accessing medical cannabis was cost, since all purchases are out-of-pocket expenses, ranging from \$200 to \$300 per month. Regarding use over time, 40 % of respondents reported a stable level of use, and 20 % reported their use changed depending on the condition.

3.4. Doctor’s recommendations

Respondents were asked if they had a regular doctor, and 157 (89 %) respondents reported that they did. However, only 15 (9%) respondents said their regular doctor was the same doctor who prescribed medical cannabis. Nevertheless, 147 (85 %) respondents said they had told their health provider about their medical cannabis use. Respondents reported that general practitioners (78 %) and specialists (78 %) were informed of their use of cannabis and both were supportive; however, specialists (87 %) were more supportive than general practitioners (79 %). Nurses ranked in the middle, with 83 % being supportive.

3.5. Medical conditions and symptoms relief

Respondents checked off several medical conditions for potential effective treatment with medical cannabis. The most common of these included depression, chronic pain, arthritis, nausea, spasms, and migraine. These six conditions accounted for more than 70 % of total conditions listed. When asked a follow-up about additional medical conditions that medical cannabis could benefit, anxiety, PTSD, insomnia, and irritable bowel syndrome were listed.

Regarding specific symptoms, patients reported greatest benefit from relief through relaxation and pain relief (Table 3). Age was negatively correlated with appetite stimulation ($Rho = -0.22$) but positively correlated with decrease in spasms or tremors ($Rho = 0.23$). A higher median yearly household income was correlated with lower ability to cope emotionally ($Rho = -0.20$) and with lower summative score of symptom relief ($Rho = -0.24$).

Many patients (64 %) also reported that their symptoms returned when they stopped using medical cannabis. These symptoms included

Table 2
Use of Medical Cannabis since Last Visit and Areas of Potential Benefit (N = 196).

Characteristic (score ranging from 1 to 10)	Use of Medical Cannabis			Spearman correlation with each characteristic		
	Overall Mean [SD]	White Mean [SD]	Black/African American Mean [SD]	Age continuous Rho	Women Rho	Household income Rho
General condition has improved	8.4 (1.7)	8.4 (1.7)	9.0 (1.2)	−0.23**	−0.04	−0.18*
Decreased pain	8.0 (1.9)	8.1 (1.8)	8.3 (1.4)	−0.16*	0.10	0.01
Decreased inflammation	7.8 (2.1)	7.9 (2.1)	7.9 (2.1)	−0.19**	0.01	−0.08
Increased appetite	6.4 (2.7)	6.2 (2.7)	8.7 (1.8)**	−0.34***	−0.09	−0.14
Improved quality of life	8.8 (1.6)	8.8 (1.6)	9.1 (1.2)	−0.26***	0.03	−0.13
Decreased nausea	7.6 (2.7)	7.5 (2.7)	8.5 (2.7)	−0.28***	−0.03	−0.13
Decreased intraocular pressure	5.6 (3.4)	5.6 (3.4)	6.3 (3.9)	−0.05	−0.12	−0.09
Decreased spasms	6.9 (3.0)	6.9 (2.9)	7.1 (3.2)	−0.07	−0.06	−0.06
Decreased seizures	4.7 (3.8)	4.4 (3.8)	7.3 (4.0)*	−0.20*	−0.21*	−0.01
Increased mobility	7.9 (2.5)	7.8 (2.4)	9.2 (1.3)	−0.09	0.02	−0.03
Increased mood	9.0 (1.5)	9.0 (1.4)	9.6 (0.9)	−0.22**	0.01	−0.09
Increased energy	8.0 (2.0)	7.9 (2.0)	9.4 (1.0)***	−0.25***	0.03	−0.14*
Summative score of benefits	83.8 (19.6)	83.1 (19.1)	92.6 (20.0)	−0.24***	−0.13	−0.13

*Household income per year ordinal categories: 1-<\$20,000; 2-\$21,000-\$40,000; 3-\$41,000-\$60,000; 4-\$61,000-\$80,000; 5-\$81,000-\$100,000; 6->\$100,000. Differences in means were tested by the T-test. P-values for correlations:

* <.05.

** <.01

*** <.001.

Table 3

Use of Medical Cannabis for Specific Medical Conditions or Symptom Relief (N = 196).

Characteristic	Using Medical Cannabis n (%)	Spearman correlation with each characteristic			
		Age	Women	Black/African American	Household income
		Rho	Rho	Rho	Rho
1-Nausea relief	107 (70.86)	-0.08	-0.04	0.02	-0.14
2-Pain relief	145 (95.39)	0.16	0.12	0.05	-0.08
3-Ability to cope emotionally	131 (89.12)	-0.06	0.01	0.09	-0.20*
4-Appetite stimulant	72 (53.33)	-0.22*	-0.15	0.18*	-0.16
5-Decrease in spasm or tremors	90 (65.69)	0.23**	0.08	0.03	-0.04
6-Relief through relaxation	146 (97.33)	0.11	-0.02	0.04	-0.10
Summary score of symptoms (1-6)		-0.08	-0.01	0.15	-0.24**

Household income per year ordinal categories: (1) <\$20,000; (2) \$21,000-\$40,000; (3) \$41,000-\$60,000; (4) \$61,000-\$80,000; (5) \$81,000-\$100,000; (6) >\$100,000. P-values for correlations:

* <.05.

** <.01.

pain, nausea, anxiety, and sleep problems. One patient shared the return of symptoms in this way: "I had entire body pain, my high blood pressure returned. My nerves were on edge, my depression returned, I couldn't sleep well. I could hardly function from the arthritis pain. My daily life came to a grinding halt. It was awful."

When asked why patients initially used medical cannabis, there were several categories of reasons: opioid-related reasons for reducing medication use, effectiveness of medical cannabis for pain or other conditions, and recommendation by a doctor or fellow patient. For example, one patient wrote, "I was addicted to my pain meds and have overdosed several times." Most patients (152 (87 %)) reported that they decreased the use of other medicines when they started using medical cannabis. Patients frequently reported stopping the use of prescription opioids, followed by anxiety medicines. For example, one patient responded, "Was able to go off oxycontin, oxycodone, fentanyl patches, soma muscle relaxers and Xanax." When asked how well medical cannabis works compared to other medicines in giving relief for their medical condition, 25 % of respondents said only medical cannabis provided relief, and 53 % responded that medical cannabis works much better than other medicines. Regarding any concerns with medical cannabis use, 35 % had concerns about the cost, 27 % had no concerns, 19 % were concerned with its illegal status, and 13 % had concerns about negative views from friends or family. Nevertheless, 87 % of respondents reported that their family or friends were generally supportive. However, some respondents reported only sharing their use of medical cannabis with family members who were supportive. In terms of potential stigma at work, one respondent commented that there was employment discrimination in hiring and subtle bias in disciplinary decisions at their job. Finally, respondents reported benefits for specific symptoms including relief through relaxation (97 %), pain relief (95 %), ability to cope emotionally (89 %), nausea relief (71 %), and decrease in spasms or tremors (66 %).

3.6. Unexpected effects and other outcomes

Respondents were asked if they had experienced any unexpected results due to medical cannabis. More than 80 % of respondents did not

experience any unexpected results, but some reported some negative side effects such as weight loss, higher anxiety from some varieties of Cannabis sativa, paranoia, and increased blood pressure. Other side effects included increased anxiety with too much use, physical symptoms such as dry eyes and coughing, and increased appetite. Some positive unexpected results included stress reduction, less nausea, improved focus, decreased allergies, and improved sleep. Open-ended survey responses suggested patients had substituted cannabis for pharmaceutical drugs, resulting in improvements in quality of life and symptoms and fewer side effects from not taking pain medications.

3.7. Interview demographics

There were 13 medical marijuana patients interviewed. Seven participants identified as white, three as Black/African American, two as Hispanic, and one as Asian. Eight participants were women, and five participants were men. Participant ages ranged from 25 to 55 years old with an average age of 38 years old.

3.8. Medical conditions

The interviews allowed for more detailed descriptions of health conditions and usage patterns. Interview participants reported that medical cannabis helped to reduce anxiety and pain, as well as address conditions related to depression, HIV, and migraines. One female participant explained: "I went through a pain management clinic for my fibromyalgia, with psychiatrists and all that for my mental health, and the medications just, the side effects were detrimental and I had no quality of life. I couldn't take care of my kids, couldn't take care of myself. It was awful, and somebody just begged me try to change and took me off it." Another female participant was specific about the benefits of medical cannabis. She responded to the benefits she received in quantitative terms: "Pain control is almost 100 percent. I would say about 90 percent pain control. Symptom control probably about 75 percent. Insomnia, maybe 60 percent. It's not as much insomnia control as I would like, but I've had insomnia for my entire life, so I really can't expect more than that. I'm grateful for the relief I get." Similar to the survey findings, interview participants explained that their symptoms would return if they stopped using medical cannabis. A female participant explained, "I've had times where I've had to stop using due to financial situations and things like that, and I definitely notice a difference where the pain, you know, I'm in pain and I'm a lot more irritable and yes, it's a big difference."

3.9. Use of prescription medications

Participants shared many details on the substitution of prescription medicines for medical cannabis. Participants reported that they ceased using several prescription drugs for pain, anxiety, and mental problems. One female participant stated, "Yeah, I completely stopped taking all of the prescriptions because I couldn't deal with side effects. I went a really long time with suffering and have been taking medical since I got it." A male participant had a similar experience of not needing to be on prescription medications and shared his story: "Fifteen years ago before I started, I was coming off six years of alcoholism. I tried literally every medication that exists for it. I weighed 270, was on six different meds for allergies, asthma, blood pressure, triglycerides, blood sugar. In less than two years, I was able to come off all of it. The blood pressure took a little longer." Another male participant explained how he stopped using prescription medications: "Well, I used to be, morphine twice a day for 12-h time release capsules and right through pain meds, Norco, 7.5 four times a day, then to 10 four times a day, and I also was on a lot of sleep medication and psych medication that I'm no longer on. I don't take any of my sleep meds anymore. I don't need them. I don't need any of my pain meds anymore."

3.10. Patterns of use and costs

The in-depth interviews provided more information about patterns of use of medical cannabis, for example one participant explained, “I take a capsule in the morning, and then I buffer with sometimes oral tinctures and vaping throughout the day. And occasionally I’ll use flower at night to help me relax.” In addition, all patients commented on how expensive they thought it was to obtain medical cannabis, and one participant did not think it was right that he could not be reimbursed by Medicare for his use of the drug. This participant explained: “I think they can afford to give me \$300 or \$400 a month for me to buy my cannabis. How many dollars is Medicare and insurance companies saving because we voluntarily left their racket and we’re saving our own money, and we’re not getting any reimbursement at all? We can’t claim it on our taxes. We can’t get reimbursement anywhere. That’s not right.” Some participants in the Florida Panhandle complained that they did not have access to the same product as other parts of Florida. For example, a female participant explained, “We don’t have access to all the cool strains that South Florida and Eastern Florida have. I don’t know why, because at the same dispensaries, they just don’t give us the products that other places have, and they don’t stock it. I mean, truly it is the main place here in Florida. Why on earth don’t they stock their dispensaries up here? Why are we less important than South Florida?”

4. Conclusions

Both the interview findings and survey results indicated a wide swath of patients sought medical cannabis for the relief of chronic pain from various medical conditions and were able to reduce their use of prescription medications. Clinical data have shown that cannabinoids provide analgesic effects which reduce the amount of opioids patients need for pain control since both classes of drugs work through similar pathways in the nervous system.¹³ Based on the survey results, patients reported that use of medical cannabis was associated with improved management of pain and nausea symptoms. The greatest benefits for patients in this study were increased mood, improved quality of life and decreased pain. This finding contrasts with the survey study by Crowell et al.³ which also reported increased mood, but also found increased overall condition and energy as the greatest perceived benefits. Reviews of controlled trials suggest that short-term, low dose administration of medical cannabis are effective to treat neuropathic pain related to cancer and other chronic conditions.^{14,15} However, a 4-year cohort study in Australia with over 1200 pain patients using prescription opioids reported that for most participants, cannabis use had no effect on their opioid use and actually led to greater pain severity.¹⁶ Some patients who reported feeling symptoms return after tapering off use of medical cannabis might have also been experiencing acute withdrawal symptoms, but this was not reported by participants. Therefore, given the complex evidence, primary care providers need to better understand the pharmacology of the cannabis plant and dosing options.¹⁷ Doing so will enable them to monitor for positive health outcomes and toxicity associated with its use and make informed recommendations.

To meet the first objective, the research identified that patients were referred to medical cannabis by healthcare providers and encountered challenges related to cost, quality, and availability of the product in dispensaries. To meet the second objective, the survey research findings indicated that the small number of Black/African American respondents reported higher satisfaction with the effects of medical cannabis than white respondents for the following indicators: increased appetite, decreased seizures, and increased energy. The research did not identify any difference based on race and ethnicity of the patients in terms of perceived benefits or preference for administration. Most patients preferred vaping for administration. Age was negatively correlated with patient benefits for most indicators, possibly suggesting that as patients age, the perceived benefits of medical cannabis may be diminished because of more severe symptoms or possibly comorbidities reducing the efficacy of the drug. By contrast, age was positively correlated with

decrease in spasms or tremors in this study. Preliminary studies have shown that modulating the cannabinoid system may be useful to treat some motor symptoms in Parkinson’s disease, which is more frequent in older people, but clinical studies are inconclusive regarding effectiveness of cannabinoid-based medicines.^{18,19} The results for gender indicated women experienced lower benefits for decreased seizures compared to men. In the study by Crowell et al.,³ women experienced higher benefits for decreased inflammation and increased mood but lower benefits for increased energy. These findings suggest that there could be differential benefits depending on gender that require further study.

This mixed methods research study provided valuable information about patients’ explanations for their patterns of use and rationale for using medical cannabis to address their medical conditions. The data provided preliminary findings which could be used to further examine the benefits that patients perceive from their use of the drug. Areas of future study include focusing on specific medical conditions, such as chronic pain-related conditions, and comparing pain management effectiveness between patients using prescription opioids and medical cannabis. A qualitative study in Illinois reported patients used medical cannabis as an alternative to prescription medications, as a method to wean themselves off of these medications, and as a complementary drug for their medications.²⁰ Like the present study, most patients in the Illinois study used medical cannabis as an alternative to prescription medicines, citing negative side effects such as damage to the liver, and a vast majority reported daily use.²⁰ Surprisingly, patients were using medical cannabis to treat several medical conditions at once, which contrasts with consumers’ typical use of a pharmaceutical drug to treat one specific medical condition (e.g., high blood pressure). There was some underlying stigma toward the perception of the patient’s use of medical cannabis by others, relating to the fact that some patients only shared their usage with trusted family and friends and did experience some discrimination from health care workers at the office of their primary health care provider. It may be the case as was identified in another study, that patients are reluctant to share their use of medical cannabis with their primary health care provider and people outside of their immediate family.²¹

In terms of research challenges, it was difficult to recruit Black/African American and Hispanic participants to better reflect the diversity of Florida’s population, so future studies would need to design more innovative recruitment strategies to reach this population of medical marijuana patients. This study identified some areas of potential benefit in terms of symptom relief that might vary by race and ethnicity, but due to the small sample size of minority patients in the survey sample, these are tentative findings and a study limitation. For example, the significant finding that Black/African Americans experienced more benefits for increased appetite, decreased seizures, and energy than white respondents might be the result of a Type I error that could be addressed by increasing the sample size of minority participants in future studies.

From a research participation perspective, a positive study outcome was identifying the willingness of respondents to complete the survey after seeing posts on social media in Florida medical marijuana patient Facebook groups. Some members of this patient population are very focused on advocacy for medical cannabis and took a very positive view toward research participation. However, the majority of respondents were women, middle-aged, and white so there was an element of selection bias in the sample receptive to recruitment messages posted on social media group sites, and possibly fewer minority respondents who were members of these online groups. Medical marijuana patients were very willing to participate in both the surveys and interviews and took an active interest in wanting to learn about the outcomes from this research study. This finding bodes well for future research on understanding patient perspectives of the use of cannabis-based medicines.

CRediT authorship contribution statement

John S. Luque: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Supervision, Funding acquisition. **Arinze Nkemdirim Okere:** Conceptualization, Writing - review & editing, Funding acquisition. **Carlos A. Reyes-Ortiz:** Formal analysis, Writing - review & editing. **Paula M. Williams:** Data curation, Project administration, Writing - review & editing.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ctim.2021.102669>.

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