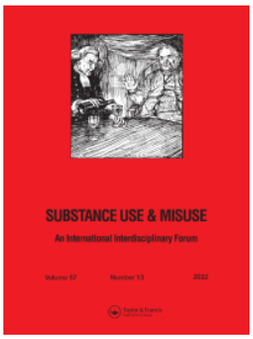

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Medical Cannabis Patients Report Improvements in Health Functioning and Reductions in Opiate Use

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ABSTRACT

Purpose: Opioid use rates have dropped as North American patients gain access to medical cannabis, indicating a harm reduction role, yet health outcomes remain mostly unexplored. This study presents self-reported medical cannabis use, perceptions of health functioning, and changes in opioid pain medication use in Florida medical cannabis patients. *Methods:* Patients (n = 2,183) recruited from medical dispensaries across Florida completed a 66-item cross-sectional survey that included demographic, health, and medication usage items, along with items from the Medical Outcomes Survey (SF-36) to assess health functioning before and after cannabis initiation. *Results:* Most participants were between the ages of 20 and 70 years of age (95%), over 54% were female, 47% were employed, and most (85%) were white. Commonly reported ailment groups were Pain and Mental Health combined (47.92%), Mental Health (28.86%) or Pain (9.07%). Health domains of bodily pain, physical functioning, and social functioning improved while limitations due to physical and emotional problems were unchanged. Most patients rated medical cannabis as being important to their quality of life. Many (60.98%) reported using pain medications prior to medical cannabis, 93.36% of these reported a change in pain medication after medical cannabis. The majority of participants (79%) reported either cessation or reduction in pain medication use following initiation of medical cannabis and 11.47% described improved functioning. *Conclusions:* The findings suggest that some medical cannabis patients decreased opioid use without harming quality of life or health functioning, soon after the legalization of medical cannabis. The public health implications of medical cannabis as an alternative pain medication are discussed.

KEYWORDS
Medical cannabis; health outcomes; mental health; pain; opioids; quality of life

Key points

- Medical cannabis patients with ailments including pain and mental health reported medical cannabis as important to their quality of life and helpful in managing their condition.
- Health functioning improved in areas of bodily pain, physical functioning, and social functioning after medical cannabis use was initiated, but limitations due to either physical or emotional problems were not changed.
- The use of opiate based pain medication may be reduced, or even ceased, especially in patients with chronic pain, soon after access to legalized medical cannabis.
- Initiation of medical cannabis laws could lead to public health changes through the potential opioid-sparing effects of medical cannabis without worsening health functioning.

Introduction

Recently, conversations regarding the problems with opioid and other pain medication use has pushed patients toward a variety of alternatives (Häuser et al., 2018; Piper et al., 2017). Medical cannabis is one alternative increasingly used to treat pain throughout the United States (Aviram & Samuelly-Leichtag, 2017; Maharajan et al., 2020; Miller & Miller, 2017; Mücke et al., 2018; Rabgay et al., 2020). As of May 2021, 36 US states, along with the District of Columbia, Puerto Rico, North Mariana Islands, and Guam had approved medical cannabis laws, with an estimated 5.461 million state-legal patients (Marijuana Policy Project, 2020). Self-report studies of medical cannabis patients have shown it being used to treat a variety of conditions including gastrointestinal problems, insomnia, mental health disorders, and most commonly, chronic pain (Boehnke et al., 2016; Bonn-Miller et al., 2014; Kosiba et al., 2019; Reinarman et al., 2011; Salazar et al., 2019; Schlienz et al., 2021; Sexton et al., 2016; Troutt & DiDonato, 2015).

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The physiological relationship between medical cannabis and pain is well-established and thoroughly described elsewhere (Busse et al., 2018; Lee et al., 2018; Miller & Miller, 2017; Woodhams et al., 2015). However, as patient access to and use of medical cannabis continues to increase, research on the viability of medical cannabis as an effective and safe alternative to opioid based pain medication (OBPM) is pivotal (Lee et al., 2021).

In the United States, prescription and illicit opioid use, along with the associated social and personal costs, has increased steadily over the last 20 years (Luo et al., 2021; Vulfsons et al., 2020). As a result, the number of deaths due to opioid overdose quadrupled from 1999 to 2019, with nearly 500,000 deaths attributed to opioid overdoses during that time (CDC/National Center for Health Statistics, 2020). The recent increase in opioid overdoses, up 28% from 2020 to 2021, has further emphasized the need to reduce harms associated with opioid use (CDC/National Center for Health Statistics, 2021).

Given the concerns around opioid use, along with increased availability of medical cannabis, some patients may attempt to reduce or cease OBPM use with medical cannabis (Lake et al., 2019; Okusanya et al., 2020). Medical cannabis users often report pain reduction as a primary reason for use (Salazar et al., 2019; Schlienz et al., 2021; Sexton et al., 2016; Troutt & DiDonato, 2015) and pain is often considered a health functioning and quality of life outcome in clinical health research (Mutubuki et al., 2020). However, studies examining health functioning in medical cannabis patients in general, including chronic pain patients or those who may have reduced use of OBPM, are limited. Though sample sizes were small, chronic pain patients have reported improvements in health functioning measures after medical cannabis use; including pain-specific health outcomes, perceived social functioning, and activity level (Haroutounian et al., 2016; Vigil et al., 2017). Another recent study of medical cannabis patients found improvements on all domains of the WHOQOL-BREF, a global measure of quality of life, among patients reporting reductions in the use of benzodiazepines, opioids, and non-opioid pain medications (Lucas et al., 2021). While generally positive, due to small sample sizes and the limited number of studies, research on health functioning and changes in medication usage remains relevant amid rising medical cannabis use.

The purpose of this cross-sectional observational study was to identify and report on the characteristics, ailments, and medical cannabis usage of Florida medical cannabis patients, as well as their perceptions of pain medication use and health functioning after legalized access to medical cannabis. Specific aims of the study were to (1) characterize the demographics and use patterns of participants who had physician-approved medical cannabis access, (2) to provide information on patient perceptions of changes in health functioning after initiation of medical cannabis use and (3) examine participant perceptions of the effects of medical cannabis access on their use of OBPM. Data was collected retrospectively within the first year of access to prescription medical cannabis. At the time of the study, Florida reported rates slightly higher than the average US rate of opioid prescriptions per 100 people (53.7 vs 51.4, respectively); the lowest rate reported in Florida since data collection began in 2006 (National Institute on Drug Abuse, n.d.).

Materials and methods

Participants and procedures

The study was approved by the Florida State University College of Medicine Institutional Review Board. Potential participants were patients on the Florida Medical Marijuana Use Registry who were prescribed medical cannabis at the time of the study and visited a medical cannabis dispensary. Participants were recruited through flyers provided at one of seventeen licensed Florida dispensaries, which comprised all dispensaries in operation by the dominant provider at the time of the study. These seventeen dispensaries were located in major population centers throughout the state of Florida. Participants were compensated with a $5 credit toward the purchase of future medical cannabis products. A 66-item survey was developed by the researchers and included items assessing demographics, medical conditions, health functioning, changes in pain medication use, and perceived changes in health functioning pre- and post-cannabis use. Interested and eligible participants were provided with a link to the online survey, which was created and administered using SurveyMonkey® (Momentive, Inc, San Mateo CA). Participant data were collected anonymously between the months of August and October 2018, with no identifying information captured. The first item asked participants to consent to the survey or the participant was routed to the end page of the survey. Only surveys that endorsed the consent item were included in the analyses (n = 26 excluded).

Measures

The 66-item survey included the following demographic information: gender, age, marital status, employment status, race/ethnicity, state/territory residency, and household income. The survey also included items assessing patient ailments, habits of cannabis use, opioid-based pain medication (OBPM) use, the perceived benefits of cannabis use, and health functioning prior to initiation of medical cannabis use (labeled as "pre" use) and subsequent to initiation of medical cannabis use (labeled as "post" use).

Comparison of health functioning before (pre) and after (post) medical cannabis initiation was measured by an abbreviated version of the SF-36 (Rand Health Care, n.d.-a). Patients were asked to report retrospectively on these items to assess their health functioning before initiating medical cannabis use (pre-), with the same items assessing their current experience (post-medical cannabis). The measure was abbreviated to shorten the length of the survey for feasibility of completion, and included the domains considered central to health functioning in this context based on other abbreviated versions of the SF-36 such as the SF-12. Therefore, the abbreviated measure included 5 of the 8 SF-36

domains: Physical Functioning (PF), Role-Physical Limitation (RP), Bodily Pain (BP), Social Functioning (SF), and Role-Emotional Limitation (RE). Respondents were asked to answer a sub-set of items from five of the domains (PF, RP, BP, SF, and RE) based on their health functioning prior to (pre) and following (post) initiation of medical cannabis use. The domain Physical Functioning (PF) included 8 items of health limits in 8 aspects; Domain Role-Physical Limitation (RP) contained 4 items of the problems due to physical health issues; Bodily Pain (BP) included 2 items on the pain level and the interference by pain; Social Functioning (SF) had 1 item about the interference degree from physical health or emotional problems; and Role-Emotional Limitation (RE) included 3 items of the problems due to emotional issues.

To further understand the characteristics of medical cannabis users and the array of medical conditions for which cannabis is used, these variables were summarized and are presented as frequencies and percentages. Self-reported changes in health functioning after initiating medical cannabis use based on the five SF-36 domains were analyzed by comparing scores, as described below. Finally, medical cannabis habits of use and the perceived importance to quality of life are summarized.

Statistical analyses

Data were analyzed using SAS version 9.4 (Cary, NC). Frequencies and percentages of variables of interest were calculated. For items and scales with missing data, the valid percentage is reported (excluding missing cases). Scoring for the health functioning scales were based on the scoring instructions from the RAND 36-Item Health Survey Version 1.0 (Rand Health Care, n.d.-b) and published reports of the SF-36 (Boston Roybal Center for Active Lifestyle Interventions, n.d.). Paired t-tests were conducted to check pain medication use, and to compare the scores of health functioning domains, before (pre) and after (post) medical cannabis initiation. Multiple Linear Regressions (MLR) were performed in each health functioning domain, respectively, to explore how the post domain score would change based on the pre domain score, and what other factors were significantly associated with the post domain score, by adjusting for the demographic variables and two conditions of interest (number of ailments and duration of medical cannabis use). Among the demographic variable candidates of age, gender, marital status, employment status, race/ethnicity, and household income, the ones that were not significant to any post domain score were excluded. The final model was built for each domain by adjusting for the same covariates across all domains, to provide a clear picture of the comparisons.

Health functioning domains (PF, RP, BP, SF, and RE)

The scoring method suggested in RAND 36-Item Health Survey 1.0 was used to recode the values for each item. The original values were in the scale of 1–2, 1–3, 1–5, or 1–6. The recoded values were all standardized on a 0 to 100 range, with higher scores indicating better functioning and lower scores indicating worse health functioning. Then, the standardized scores of all items in each domain were averaged to form an overall score in each domain, respectively. The number of items in each domain from our survey was equal to or less than the numbers in the corresponding domain from the SF-36, but the same algorithm was applied. The domain scores represent weighted sums of the items in each domain.

Coding of pain medication use changes

Participants were asked whether or not cannabis use changed their use of pain medications (yes/no). Participants who answered in the affirmative were then asked a follow-up, open-ended question "Briefly describe how cannabis use has changed your use of pain medications". The open-ended responses provided were then categorized and coded based on commonly reported themes and statements. Codes were developed to capture the majority of open-ended responses into a theme (over 93% of responses fit into one of the five codes). The five codes included 1) ceased use of all pain medications (e.g. "Since using cannabis, I have not had to take any pain medication. Only cannabis", 2) reduced the use of pain medications (e.g. "I take 1 or 2 low dose pain pills now compared to before 6 or 8 pain pills a day; Much better to take only when needed and only if needed", 3) improvements in functioning as a result of reducing pain medications (e.g. "I am able to function more at home without using prescription medications for all my aches and pains; I am more interested in doing projects around the house and I have more patience with my children", 4) reduced use of both pain and psychotropic medications (e.g. "I no longer take pain meds or anti-anxiety meds as a first go to, I turn to my vape and use what I need depending on what is the problem", and 5) added medical cannabis to pain medication regimen (e.g. "I have not changed from my Western medicine prescribed dosages. Medical Marijuana has been added to usage due to [additional] diagnosis."). Any responses that did not fit into a theme were categorized as "Other". Coding was then conducted independently by two trained coders who achieved an intercoder reliability of R > .80.

Results

Participant demographics and ailments

Among 2,209 respondents, 26 did not provide consent, so the remaining 2,183 consenting respondents were included in the analyses.

Table 1 displays the demographic characteristics of the sample. As can be seen, slightly over half of participants were female (54.42%); most participants were 30–60 years old and about evenly distributed across age groups; 49.25% were married, and 84.70% were white. The remaining commonly reported race/ethnicities were Hispanic (4.94%), black (2.66%), or mixed race/ethnicity (6.48%). Most respondents

Table 1. Demographic characteristics and ailments of all respondents (N = 2183).

Self-reported item	Category	Frequency	%
Gender	Female	1150	54.42
	Male	963	45.58
Age	21–29	236	11.11
	30–39	453	21.32
	40–49	441	20.75
	50–59	485	22.82
	60–69	403	18.96
	>= 70	107	5.04
Marital Status	Non-married	1086	50.75
	Married	1054	49.25
Employment Status	Employed (full-time/part-time)	963	46.75
	Not Employed	188	9.13
	Retired	345	16.75
	Disabled, not able to work	564	27.38
Race/Ethnicity	Non-White	318	15.30
	White	1760	84.70
Residency state/Territory	Non-Florida	15	0.71
	Florida	2087	99.29
Household income	$0 to $9,999	105	5.51
	$10,000 to $24,999	310	16.28
	$25,000 to $49,999	528	27.73
	$50,000 to $74,999	379	19.91
	$75,000 to $99,999	238	12.50
	$100,000 to $124,999	159	8.35
	$125,000 and up	185	9.72
Ailments* (Choose all that apply)	Pain	188	9.07
	Cancer	35	1.69
	Mental Health	598	28.86
	Pain + Cancer	14	0.68
	Pain + Mental Health	993	47.92
	Pain + Cancer + Mental Heath	71	3.43
	Cancer + Mental Health	27	1.30
	Other (not pain, cancer, mental health)	146	7.05

*responses were grouped together based on type of ailment(s) in the Choose all that apply question. See Supplementary Table 1 for the most commonly reported individual ailments.

were employed (46.75%), disabled (27.38%) or retired (16.75%), had a household income between $25,000 and $75,000 (47.64%) and permanently resided in Florida (99.29%).

Most participants reported between one and five different ailments; 23% reported 1–2 ailments, 44% reported 3–5 ailments and 33% reported 6 or more ailments. For the purposes of this report, commonly reported ailments were grouped together by type. Pain and Mental Health was the largest ailment group (47.92%), followed by Mental Health (28.86%) and Pain (9.07%) (see Supplementary Table 1 for the most commonly reported ailments).

Medical cannabis use patterns

Habits of patient use varied greatly among the respondents (Table 2). The majority reported using medical cannabis daily, such as regularly throughout the day (54.99%), occasionally throughout the day (24.55%), 1–2 times per day (9.72%) or evenings only (8.66%). Most reported that they perceived their current levels of cannabis use to be the correct/necessary amount (60.60%), although some felt use was slightly more than needed (7.21%) or slightly less than needed (12.22%). A small number of participants did report using cannabis medicinally for over 10 years (7.86%), though

Table 2. Habits and perceptions of patient use of all respondents.

Usage and perception items (number of responses)	Frequency	Percent
What best describes your current level of cannabis use? (N = 1882)		
Regularly throughout the day	1035	54.99
Occasionally throughout the day	462	24.55
Once or twice a day	183	9.72
Evenings only	163	8.66
Several times a week	25	1.33
Weekends only	4	0.21
Several times a month	10	0.53
How do you feel about your current level of cannabis use? (N = 1858)		
Much less than needed	70	3.77
Slightly less than needed	227	12.22
Correct use	1126	60.60
Slightly more than needed	134	7.21
Much more than needed	76	4.09
Not concerned	225	12.11
How long have you been using medical cannabis? (N = 1934)		
0–12 months	1259	65.10
1–3 years	406	20.99
3–5 years	63	3.26
5–10 years	54	2.79
Over 10 years	152	7.86
How helpful is medical cannabis use when dealing with your medical condition(s)? (N = 2084)		
Not at all helpful	2	0.10
Slightly helpful	38	1.82
Moderately helpful	156	7.49
Very helpful	579	27.78
Extremely helpful	1309	62.81
How important are medical cannabis products to your overall quality of life? (N = 1871)		
Not at all important	18	0.96
Slightly important	34	1.82
Moderately important	160	8.55
Very important	530	28.33
Extremely important	1129	60.34

most participants reported beginning use after Florida legalization of medical cannabis; for less than 12 months (65.10%) or between 1 and 3 years (20.99%). Patient perceptions regarding medical cannabis as a treatment were largely positive, despite the majority (68.72%, N = 1158) reporting at least one side effect. Most (90.59%) reported that medical cannabis was very or extremely helpful when dealing with their medical condition; less than 2% reported it as slightly or not helpful at all. Over 85% reported medical cannabis products were very or extremely important to their quality of life (88.67%).

Health functioning before and after initiating medical cannabis use

Patients reported on items measuring health functioning and limitations due to health before and after medical cannabis (Table 3.1). The largest percentage of all items was reported as either improved (i.e. Pain interferes with normal work) or remained the same (i.e. Due to physical problems. I have difficulty performing work) after initiating medical cannabis use; for no items (or domains) did the largest percentage of participants report worsened health

Table 3.1. Self-reported health functioning and changes pre- and post-medical cannabis.

	Percent change						Paired t-tests of means		
	Post-medical cannabis								
	Improved outcomes		Same/No change		Worse outcomes		Difference (post-pre scores)		
Health functioning domain	N	%	N	%	N	%	Mean[1] (SD)	P-value	Cohen's D
Physical functioning (8 Items)	1467	75.97	380	19.68	84	4.35	26.55 (27.10)	<.0001	1.0
Role-physical limitation (4 Items)	236	29.10	545	67.20	30	3.70	13.87 (27.89)	<.0001	0.5
Bodily pain (2 items)	1726	89.66	161	8.36	38	1.97	35.15 (22.87)	<.0001	1.5
Social functioning (1 Item)	1599	84.03	242	12.72	62	3.26	43.64 (32.05)	<.0001	1.4
Role-emotional limitation (3 Items)	133	19.56	531	78.09	16	2.35	9.66 (23.72)	<.0001	0.4

[1]Mean difference scores for each domain (post minus pre); a positive value indicates improvement in domain mean Post-score.

Table 3.2. Multiple linear regression of post-medical cannabis scores for each health functioning domain.

	Domains									
	Physical functioning (PF)		Role-physical limitations (RP)		Bodily pain (BP)		Social functioning (SF)		Role-emotional limitations (RE)	
Parameter	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value
Intercept	67.8963	<.0001	55.5026	<.0001	68.7530	<.0001	81.9502	<.0001	48.3389	<.0001
Domain pre- score	0.3712	<.0001	0.3409	<.0001	0.3800	<.0001	0.1512	<.0001	0.2990	<.0001
Age (ref: 21–29)										
30–39	1.6798	0.3133	−2.0734	0.4764	−0.7660	0.6096	−0.3055	0.8756	−0.9892	0.6763
40–49	0.0872	0.9596	−3.3437	0.2366	−1.8848	0.2251	0.9842	0.6246	2.4629	0.3009
50–59	−3.5632	0.0408	−0.4031	0.8852	−2.9471	0.0594	3.6778	0.0710	1.1004	0.6441
60–69	−5.0635	0.0100	−2.7047	0.3743	−1.4704	0.4046	4.2878	0.0640	1.1528	0.6596
>=70	−12.7669	<.0001	−6.7870	0.0996	−2.5788	0.3104	4.5480	0.1730	−3.5117	0.3359
Employment (ref: employed)										
Not employed	−0.7385	0.6542	−4.2689	0.1203	−2.3488	0.1140	−2.2438	0.2477	−3.9207	0.0899
Retired	−4.2885	0.0137	−0.5256	0.8313	−7.3377	<.0001	−4.1869	0.0401	−1.2871	0.5728
Disabled	−16.5131	<.0001	−6.1531	0.0004	−13.0552	<.0001	−10.5671	<.0001	−3.8207	0.0151
Race (ref: Non-White)										
White	−2.9802	0.0208	−1.7606	0.3667	−5.3686	<.0001	−5.1569	0.0007	−0.3701	0.8304
Number of ailments	−0.3197	0.0800	−0.1475	0.5471	−0.6116	0.0002	−0.89489	<.0001	0.0143	0.9478
Length of Cannabis Use	0.6283	0.1017	−0.1418	0.8206	0.7257	0.0359	1.0351	0.0209	−0.5535	0.3115

functioning after medical cannabis. Improvements were seen on items in the domains of Physical Functioning (e.g. vigorous or moderate activity), Bodily Pain (e.g. level of bodily pain or interference of pain in normal work), and Social Functioning (e.g. health interfered with normal social activities). Most participants reported no changes in the domains of Role-Physical or -Emotional Limitations (e.g. limitations or difficulties due to physical or emotional problems) after initiating medical cannabis use.

Comparisons of the pre- and post- scores using paired t-tests indicated significant differences after initiation of medical cannabis use, with all health functioning domain scores showing significant improvement ($p < .0001$; Table 3.1). The results from the multiple linear regressions (Table 3.2) showed that in each domain, the post domain score increases as the pre domain score increases, holding all other factors constant in the model. As participant age increased, physical functioning (PF) scores decreased; compared to those in their 20's, PF scores were significantly lower for those in age groups of 50 years old and above. Compared to those employed, those self-reporting as disabled had significantly lower post scores in all domains, while those retired showed significantly lower post scores in PF, bodily pain (BP), and social functioning (SF). Those self-reporting as white had lower post PF, BP, and SF score than other races or nationalities. Scores in bodily pain and social functioning domains were also lower in those with more ailments or with increased length of medical cannabis usage, adjusting for all other factors in the model. Gender, marital status, and household income were not significant in any domain.

Pain medication use before and after medical cannabis legalization

Pain medication use before and after access to medical cannabis is displayed in Tables 4 and 5. Table 4 describes the use of opioid-based pain medications (OBPM) before and after patients began using medical cannabis. Most patients reported using hydrocodone-acetaminophen (36.82%) or oxycodone-acetaminophen (26.78%) while oxycodone, hydrocodone, and codeine alone were reportedly used by 10–20% of responding participants. Reported use of all OBPM was below 7.5% of patients after beginning medical cannabis use; the most used medications were reduced 5-fold (hydrocodone-acetaminophen, 7.31%; oxycodone-acetaminophen, 4.78%). The number of different medications used also decreased after medical cannabis access.

The paired t-tests also showed the same pattern, the mean number of uses for each medication after medical cannabis initiation was significantly lower than before ($P < .0001$, Cohen's $d = 0.2$), and the same finding was seen for the mean of the total number of different medications ($P < .0001$, Cohen's $d = 0.6$). The average number of those who reported using none of the listed medications was also significantly higher than before ($P < .0001$, Cohen's $d = 0.8$).

Table 4. Type and amount of pain medication used pre- and post-medical cannabis access.

Pain medication use items	Pre-medical cannabis N	Pre-medical cannabis %	Post-medical cannabis N	Post-medical cannabis %
Which of the following medications do you use for pain? (Choose all that apply)				
None	746	39.02	1484	79.74
hydrocodone/acetaminophen (Lorcet, Lortab, Norco, Vicodin)	704	36.82	136	7.31
oxycodone and acetaminophen (Percocet, Roxicet)	512	26.78	89	4.78
oxycodone (OxyContin, Oxaydo)	369	19.30	63	3.39
hydrocodone (Hysingla ER, Zohydro ER)	310	16.21	36	1.93
codeine (only available in generic form)	238	12.45	42	2.26
morphine (Kadian, MS Contin, Morphabond)	193	10.09	51	2.74
hydromorphone (Dilaudid, Exalgo)	176	9.21	25	1.34
fentanyl (Actiq, Duragesic, Fentora, Abstral, Onsolis)	150	7.85	32	1.72
oxycodone and naloxone	95	4.97	18	0.97
methadone (Dolophine, Methadose)	86	4.50	22	1.18
meperidine (Demerol)	57	2.98	7	0.38
How many different medications do you use for pain?				
None	746	39.02	1484	79.74
1	493	25.78	285	15.31
2	279	14.59	68	3.65
3 – 5	290	15.17	21	1.13
6 – 8	80	4.18	2	0.11
9 – 11	24	1.26	1	0.05

Table 5. Changes to pain medication use following medical cannabis initiation.

Pain medication use (number of responses)		N	%
Prior to medical cannabis use, did you use pain medications? (N = 1912)			
No		746	39.02
Yes		1166	60.98
If yes, how long did you use pain medications (prior to medical cannabis use)? (N = 1161)			
Never		10	0.86
≤ 6 months		142	12.23
6–12 months		77	6.63
1–2 years		113	9.73
2–5 years		242	20.84
5–10 years		245	21.10
10+ years		332	28.60
If yes, did medical cannabis use change your use of pain medications? (N = 1114)			
No		74	6.64
Yes		1040	93.36
If yes, how has medical cannabis use changed your use of pain medications? (N = 959)			
Group/Category	Description of response	N	%
Ceased pain meds	Ceased pain medication use as a result of using medical cannabis	400	41.71
Reduced pain meds	Reduced the need for and use of pain medications	360	37.54
Change improved functioning	Improved functioning with more use of medical cannabis and less use of pain medications	110	11.47
Ceased pain/ psychiatric meds	Completely off all pain and psychiatric medications (e.g. for anxiety, depression, PTSD)	26	2.71
Added MC	Added medical cannabis	17	1.77
Other	Other (non-categorized) responses	46	4.80

Table 5 shows that 60.98% of patients reported using OBPM prior to medical cannabis. A large portion (70.54%) of these participants reported using OBPM for 2 or more years prior to medical cannabis access and 93.36% reported a change in their use of pain medications after beginning medical cannabis use.

When asked to describe how medical cannabis changed the use of pain medications, the majority (79.25%) reported substantial reductions or complete cessation of pain medications as a result of medical cannabis. Another 11.47% reported improved functioning by utilizing medical cannabis and decreasing OBPM. A smaller percentage, 2.71%, reported cessation of both pain and psychiatric medications. Another 1.77% reported adding medical cannabis only (Added MC) while 4.80% were unable to be categorized (Other); no responses indicated an increase in pain medication use.

In those patients who described a change in medication use, all groups reported that medical cannabis was extremely or very important to their quality of life, with responses being congruent with the overall study sample. The same pattern of domain changes emerged as for overall respondents, regardless of change in pain medication status, indicating those who reported changes in pain medication use did not differ from the overall study sample on these measures.

Discussion

Both the NASEM and a recent mapping study report that there is substantial evidence to support medical cannabis as a treatment for chronic noncancer pain in adults (Jugl et al., 2021; National Academies of Sciences Engineering & Medicine, 2017). There is also a growing body of evidence indicating that medical cannabis patients may engage in harm reduction by reducing or replacing prescription pain medications without negatively impacting quality of life (Boehnke et al., 2016; Nielsen et al., 2017; Okusanya et al., 2020; Reiman et al., 2017; Schlienz et al., 2021; Sohler et al., 2018; Takakuwa et al., 2020; Vigil et al., 2017). Surprisingly, general health functioning outcomes in this patient population have not been as thoroughly explored. This report describes a large sample of patients who sought medical cannabis access upon statewide legalization and their self-reported habits and perceptions of medical cannabis use. The majority of Florida medical cannabis users surveyed described medical cannabis as helpful and important to their overall quality of life. Notably, a large percentage of patients reported improvements in the areas of physical functioning, social functioning, and bodily pain after beginning medical cannabis. We also found a substantial number of patients reduced the amount of OBPM used after gaining access to legalized medical cannabis, with some patients specifically describing improved functioning in daily life as a result.

The overall patient demographics were expected as they reflect the population with the greatest access to and likelihood of using the 2015 Florida Compassionate Medical Cannabis Act, which constituted 1.13% of the population at the time of the study (Mahabir et al., 2020; Marijuana Policy Project, 2020). The demographics, ailments reported,

and habits of use reported by our respondents were like previous studies (Bonn-Miller et al., 2014; Lucas et al., 2021; Mahabir et al., 2020; Reinarman et al., 2011; Salazar et al., 2019; Schlienz et al., 2021; Sexton et al., 2016; Troutt & DiDonato, 2015). Almost half (47.92%) of patients reported both pain and mental health diagnoses, while 28.86% of patients reported one or more mental health concerns and 9.07% reported one or more pain diagnosis only. Most patients used medical cannabis daily and felt the amount used was appropriate for them. The majority reported that medical cannabis was very helpful when dealing with their health conditions and very important to their quality of life, despite the usual amount of various mild side effects.

Over half of patients reported using at least one pain medication prior to initiation of medical cannabis usage; the most common were hydrocodone/acetaminophen and oxycodone/acetaminophen. Uses of these and all other OBPM were reduced after access to legalized and regulated medical cannabis. Even with the substantial reductions in OBPM seen in our study, we noted that most respondents had only recently begun using medical cannabis, indicating that prescription medical cannabis could encourage changes to OBPM use soon after legalized access. This is especially notable when considering that almost half of these patients had used OBPM for 2 or more years.

Most patients who had used pain medications prior to initiation of cannabis use reported either cessation of all pain medications or considerable reductions in use of pain medications. Another 11.47% described various ways that their daily functioning improved when substituting medical cannabis for pain medications.

Most patients reported that medical cannabis was a helpful treatment for their medical condition and was important to quality of life, regardless of OBPM use or changes to use. Improvements were reported for the health functioning domains of Bodily Pain, Social Functioning, and Physical Functioning. Role Limitations due to Physical Health or Emotional Problems were unchanged, indicating that performance at the level of activity and participation did not improve or worsen with medical cannabis use. The pattern of changes to health functioning domains remained consistent in those patients who reported OBPM changes. This suggests that some patients may consider medical cannabis as a viable treatment option, reducing or replacing OBPM without sacrificing health functioning or quality of life.

The findings from our large sample size suggest that prescription medical cannabis could play an important role in quality of life and opioid harm reduction for patients with pain. At the community level, medical cannabis could have a more immediate role in managing the opioid epidemic than previously thought, as access to prescription medical cannabis had occurred less than 2 years prior to data collection. Our data add to recent reports that opioid use decreased in various US states (Lopez et al., 2021) and throughout Canada (Lee et al., 2021) as medical cannabis became available. Although our data cannot speak to the individual-level therapeutic effect of medical cannabis over time, they do lend support and further insight to recent reports of longitudinal improvements in all quality-of-life domains (social relationships, physical health, and psychological health) for medical cannabis users reporting reductions in various prescription medication use (including benzodiazepines, non-opioid and OBPM) (Lucas et al., 2021).

In all, these data add to the growing body of literature suggesting that medical cannabis use may be associated with reductions in opioid (and other) prescription medication use without reducing quality of life or worsening health outcomes. A recent meta-analysis found a medium-to-large effect of cannabinoids to reduce pain (Yanes et al., 2019) and a significant effect of cannabinoids for 30% pain reduction was found across 47 randomized controlled trials (Stockings et al., 2018). Together, these findings indicate that medical cannabis could be an effective option in treating chronic noncancer pain. Along with other recent reports (Lucas et al., 2021; Segura et al., 2019; Takakuwa et al., 2020), our data suggest that medical cannabis could be a viable alternative to OBPM in certain patients and under proper medical supervision. Furthermore, our unexpected finding of a small but notable group willing to reduce or eliminate psychiatric medications after medical cannabis access urges further study into populations with mental health ailments.

Limitations

These findings must be considered in light of the study limitations. This study used an anonymous, cross-sectional self-report survey; medical record or corroborating information on medical conditions was not possible. Participants were recruited through dispensaries and self-selected, thus the data may or may not be fully representative of the population of cannabis users in the state of Florida. Due to the anonymous nature of the survey, a comparison of possible systematic differences between those who responded and those who did not respond was not possible. Although we attempted to reduce multiple responses through the survey site, participants could have responded more than once using different devices. Reports of changes in health functioning prior to and following initiation of cannabis use were collected cross-sectionally and may be subject to recall bias. Studies have shown that recall bias associated with the Medical Outcomes Study Health Functioning measures to be small (Topp et al., 2019) and the reliability and validity to be acceptable (Perneger et al., 1997; Schmier & Halpern, 2004). While the Florida laws had recently been implemented at the time of our study and most participants reported only initiating medical cannabis use since legalization, a small number of respondents reported longer-term use of medical cannabis which may exaggerate recall bias. In general, study participants were active users of cannabis, and data did not capture medical cannabis patients who chose to discontinue cannabis use.

Conclusions

Despite these limitations, the results from this large sample indicate that medical cannabis may play important roles at

both the individual and community level by being a viable alternative to opioids when managing pain. We found that opioid use was substantially reduced soon after access to medical cannabis, and that some patients appear to prefer medical cannabis as it allows them to function better in daily life. Like other reports, these data also highlight the need for further study of medical cannabis use in patients with mental health ailments. Importantly, the community-level findings indicate that medical cannabis could have a positive impact on the opioid epidemic public health crisis by being a viable alternative to OBPM soon after legalization.

In conclusion, some patients may reduce or even cease use of OBPM upon access to medical cannabis, potentially without harming quality of life or health functioning. This is suggestive of the harm reduction role and opioid-sparing effects of medical cannabis in a quality-controlled and regulated medical-use only state. Given the great individual and societal costs associated with the opioid crisis (Florence et al., 2021; National Institute on Drug Abuse, n.d.), the public health implications of these findings are important to consider.

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Consent to participate

Informed consent was obtained from all participants including in the study analyses. No identifying details were obtained. Participants could not continue with the survey if they did not agree to the Informed Consent.

Disclosure statement

HF and YW have no conflicts of interest to declare. In accordance with Taylor & Francis policy and my ethical obligation as a researcher, CEP is reporting that I have received funding to partially support some research costs from a company that may be affected by the research reported in the enclosed paper. I have disclosed those interests fully to Taylor & Francis, and I have in place an approved plan for managing any potential conflicts. In accordance with Taylor & Francis policy and my ethical obligation as a researcher, JEP is reporting that I was a Trulieve non-shareholding employee during part of the study period. I have disclosed those interests fully to Taylor & Francis, and I have in place an approved plan for managing any potential conflicts arising from stock ownership.

Ethics approval

All methods and procedures were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments and comparable ethical standards and approved by the Florida State University College of Medicine Institutional Review Board prior to study initiation (approval date: 06/21/2018, Assurance no. IRB00000446). This study was performed in line with all ethical guidelines.

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