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Self-Reported Use and Effectiveness of Marijuana for Pelvic Pain Among Women with Endometriosis

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Abstract

Background/Objectives: Legal access to cannabinoids is increasing, and patients with chronic pelvic pain from endometriosis were hypothesized to explore and find benefit from the use of marijuana for symptom management. A survey of women with endometriosis was conducted with the objective of characterizing their experience with marijuana for management of pelvic pain: exploring symptom benefit, characteristics of use, and factors contributing to use and discontinuation. Methods: A descriptive cross-sectional survey was undertaken using an anonymous online questionnaire. Participants were recruited from an outpatient gynecology clinic using endometriosis ICD-10 diagnostic codes, and from the Endometriosis Association mailing list. Results: Marijuana use for symptom relief was reported by 78 (32.2%) Endometriosis Association participants, and 58 (46.8%) clinic participants. Within both populations, marijuana was considered very or moderately effective by most users (68.0 to 75.9%). Legality of recreational and medicinal marijuana in the state of residence was strongly associated with use (OR 7.13 [95% CI: 2.57–19.8]). Among users specifying current or past use, discontinuation was reported by 45% (54 of 121), and most frequently attributed to non-clinical factors of legal/employment risk and obstacles to marijuana access; 64.8% of former users attributed discontinuation to non-clinical factors only. Lack of symptom relief from other clinical management was the most cited motivation for initiation (55.1% clinic, 39.7% EA users). Conclusions: Marijuana use is common among women with endometriosis and chronic, refractory pelvic pain. Legality and access appear to impact use and discontinuation. While legal access to marijuana is associated with increased use, marijuana obtained outside of legal routes is also commonly being used for symptom relief.

Keywords: endometriosis; pelvic pain; cannabis

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1. Introduction

Endometriosis is a common cause of chronic pelvic pain in women, for which there is no cure and high rates of pain recurrence despite treatment with surgery or hormone-related medication [1]. Dissatisfaction with current treatment is common, exhibited by 36% of Australian women in a recent study [2], and use of alternative or self-care therapies for symptom management is common [2,3]. Basic scientific research shows that the pathophysiology of endometriosis may involve deficiency in the endocannabinoid system within female reproductive organs, with cannabinoid receptor 1 (CB1) mediating the anti-inflammatory

effects of progesterone, and lower CB1 expression in patients with endometriosis [4]. Both Tetrahydrocannabinol (THC) (which activates CB1 and CB2 receptors) and CB1/CB2 cannabinoid receptor agonist WIN 55,212-2 have demonstrated anti-proliferative effects on stromal endometriotic cells, in vitro [5] and in a mouse model [5,6]. CB1 agonists have been shown to decrease endometriosis-associated pain in a rat model [7]. Taken together, these findings lend plausibility to the idea that cannabinoids could specifically benefit women with chronic pain related to endometriosis, a conclusion supported by several recent literature reviews [8–10].

The changing legal status of marijuana in many polities has led to increased availability, and evidence shows that endometriosis patients are exploring the use of endometriosis for the management of pelvic pain. In Australia, where only medical marijuana is legal, 13% of 484 survey participants reported self-management with marijuana within the previous 6 months; average reported pain relief was 7.6 on a 0–10 scale [3,11]. An analysis of marijuana use for endometriosis symptom control among 252 Canadian users of a smart phone app for monitoring medical marijuana indicated treatment of pelvic pain as the most common reason for use (42.4% of sessions) [12]. A 2019 survey of 113 patients of a Florida specialty gynecologic clinic with pelvic and perineal pain, dyspareunia, or endometriosis reported marijuana use among 23% of respondents, with 96% of users reporting symptom improvement [13]. Recent literature reviews of marijuana-based medicine for endometriosis have concluded that data is limited and that more comprehensive research was required before use of cannabinoid compounds could be recommended or prescribed [14]. Nonetheless, all cross-sectional surveys on the topic have demonstrated that most marijuana users report pain relief with minimal side effects, so cannabinoids may be effective in relieving pain from numerous gynecologic conditions including endometriosis [15]. In addition, authors cite observational evidence that cannabis use for chronic pelvic pain may decrease opiate use, recommending that future research should focus on this outcome [16].

Despite the broad availability of marijuana, clinical research on this topic is difficult to conduct due to legal restrictions, ethical concerns, and social stigma impacting participation. We therefore undertook an anonymized survey of women with endometriosis. We queried their experience with marijuana for management of endometriosis and pelvic pain symptoms, addressing perceived effectiveness; effects and side effects of use; and demographic, social, and legal factors that may influence use.

2. Materials and Methods

A descriptive cross-sectional survey was conducted using an anonymous online questionnaire in April and May 2019. This research was conducted at an academic-affiliated private gynecologic clinic in Arizona that is a referral center for evaluation and treatment of chronic pelvic pain. Invitations to participate were distributed to two populations: (1) clinic patients seen over a two year period (from 1 January 2017 to 31 December 2018) with an endometriosis ICD-10 diagnostic code (N80.0 through N80.9) in their electronic medical record and an email address listed in the electronic medical record, and (2) members of the Endometriosis Association (EA) support group mailing list. Participants were asked to attest to being a woman 18 years of age or older with a diagnosis of endometriosis. Postmenopausal patients were not excluded from participation as the survey inquired about historic use of marijuana for endometriosis symptoms. The anonymous survey entailed an original structured questionnaire with 55 to 75 questions with adaptive questioning, 9 to 11 pages in length. The instrument queried pelvic pain symptoms, treatment history, marijuana use, demographic factors, and comorbidities. The survey was developed and revised with pilot testing of the electronic questionnaire by physician subject-matter experts and pilot patients drawn from the leadership of the Endometriosis Association, to achieve

face and content validity. Recruitment was initiated by sending an email solicitation that described the study purpose, participation criteria, anticipated 10–30 min survey length, and assurance of the anonymous nature of this survey. The email solicitation included a hyperlink to the REDCap open survey; the email solicitation was resent one week later. The survey remained open for one month. No incentive was offered for study participation, as this would have been difficult to administer anonymously. The IP addresses of the clients' computers were not collected to preserve the anonymity of study participants. An online introduction page provided information on the investigator identity and study purpose, and a statement of informed consent describing risks and benefits to participants. The institutional IRB granted a waiver of consent to avoid any risk to privacy from linking de-identified data with identifiers that would be required to document consent. Study data were collected and managed using REDCap electronic data capture tools hosted at Barrows/Dignity Health: REDCap® (Vanderbilt University, Nashville, USA, Available online: https://redcap.dignityhealth.org/surveys/?s=RX383HYHMY; accessed on 29 November 2018) [17,18].

Email invitations to participate were sent to 701 clinic patients, with 19.5% (137) initiating the survey and 17.7% (124) completing the survey. Email invitations to participate were sent to 24,259 email addresses through the EA support group mailing list, with 1.5% (352) initiating and 1.0% (249) completing the survey, including two international participants. Participants who completed >75% of data items were included in the survey analysis. Missing data resulted from questions where no multiple-choice answer was selected, or from free-text answers that were either missing or illogical (e.g., years of pain duration indicated > 100). For each statistical analysis, respondents missing data for the examined variable were excluded. The multivariate analysis excluded participants with missing data for any variable included in the multivariable model.

In descriptive analyses, we tabulated the following: demographic factors; comorbidities; use of alcohol, tobacco, and recreational drugs; and legality of marijuana in the state where each woman resided. We summarized counts and proportions for participants in the clinic and EA groups and for the total sample. We used independent sample *t*-tests and Pearson's chi-squared tests to compare the characteristics of marijuana users to non-users in each group (clinic, EA, total) and reported age at time of the survey and duration of pelvic pain using means and standard deviations.

A binary variable was created to indicate the lifetime use of marijuana for the relief of pain. Participants who answered "Yes, in the past", or "Yes, currently" to the question "Have you used marijuana for medicinal purposes, such as relief from chronic pain?" were coded as "Yes" to ever having used marijuana. To account for missing data, if a participant declined to reply to the aforementioned question but indicated that she had used marijuana for relief of chronic pelvic pain through her response to a separate effectiveness question "What treatments have you attempted with the specific goal of helping relieve your endometriosis/chronic pelvic pain, and how well have they worked?", participants who rated the effectiveness of "marijuana/cannabis/THC", instead of indicating "Have Never Tried" as a response were also coded "Yes" for lifetime marijuana use (15 survey participants). Through survey branching logic, these 15 patients were not asked additional questions about their marijuana use and were not included in those analyses. Throughout this manuscript, unless otherwise specified, "use" refers to the use of marijuana for symptom relief.

Participants were asked to rate treatments, including "Marijuana/Cannabis/THC" and "Cannabidiol (CBD) (without THC) products" as "Not effective", "Slightly effective", "Moderately effective", "Very effective", or "Have Never Tried" for relief of endometriosis/chronic pelvic pain. Among those who reported using marijuana, we also examined

frequency and duration of use, legality in state of use, possession of a medical marijuana card, use in pregnancy, symptoms treated, side effects, methods of obtaining marijuana, and reasons for initiation and cessation of use.

We used logistic regression to estimate univariate associations between ever using marijuana for relief of pain (yes, no), each aforementioned demographic and legality variable, and variables such as sexual orientation, use of substances other than marijuana, and co-morbidities. We estimated univariate associations separately for clinic and EA groups and, finding results to be similar, we estimated these associations for the total sample by introducing an indicator for group (clinic, EA). To construct the final models, we used a purposeful selection method [19] in which variables with a bivariate p-value of <0.25 were included in further multivariate analysis. This process identified age (years), lifetime recreational drug use, lifetime tobacco use, sleep problems, participant-perceived legality of marijuana in her state, education, and employment as variables in the final multivariate model. Likelihood ratio tests and p-values were used to assess deletion of variables and model fit. The final multivariable models were checked for goodness of fit and explained variance. We used SPSS Version 25 to implement all analyses. A p-value of 0.05% or less was used to define statistical significance.

3. Results

Participants who completed the survey ranged from 18 to 70 years of age. Menopausal status was not interrogated, but using age as a proxy, 80.1% of respondents indicated age < 50 (likely pre-menopausal), and 11.0% indicated age > 50 (likely post-menopausal). Those in the clinic group tended to be younger than those in the EA group (mean ages 33.1 versus 46.9 years); in both groups, women who reported using marijuana were younger than those who did not. Participants in both groups reported long histories of pain, but average duration was shorter in the clinic group (12.5 vs. 23.3 years). Additional demographic features of participants are reported in Table 1.

Use of marijuana for symptom relief was reported by 45.1% of clinic participants, 23.8% reporting current and 21.3% past use, and by 28.3% of EA participants, 16.3% reporting current and 12.0% past use. In both groups, those who reported current or past marijuana use were more likely to report possessing a marijuana card; residing where medical use of marijuana was legal; and using CBD (without THC), other recreational drugs, and tobacco. Reported substance use is described in Table 1.

Among co-morbidities queried, participants most commonly reported a history of allergies (48.8%), headaches (39.7%), depression (37.7%), problems with digestion (29.5%), and sleep problems (29.5%). Women who used marijuana more often reported sleep problems, but not other common comorbidities. Reported comorbidities are described in Table 1.

Multivariate analysis identified factors most strongly associated with using marijuana for symptom relief. Such use was much more common in young women and estimated to be 7–9% lower for each year of participants' age at the time of participation. In addition, use was nearly 6-fold greater in women with a history of recreational drug use than in those without (adjusted OR 5.77 (95% CI 2.90, 11.49)). Compared to those who reported living where all marijuana use was illegal, use was 3-fold greater in those living in states where medical marijuana use was legal (adjusted OR 3.04 (95% CI 1.29, 7.17)) and 7-fold greater for those in states where recreational use was legal (adjusted OR 7.13 (95% CI 2.57, 19.81)). Use was also 2- to 3-fold greater in those who did not finish college, those with a disability preventing work, and those who reported sleep difficulties. Detailed results of multi-variate analysis are provided in Table 2.

Table 1. Demographic characteristics, substance use, and comorbidities of participants [1], according to study group and marijuana use.

	Clinic Group Participants			EA Group Participants			Total Sample		
Marijuana Use:	**Non-Users N = 66**	**Users N = 58**	**Total N = 124**	**Non-Users N = 171**	**Users N = 78**	**Total N = 249**	**Non-Users N = 237**	**Users N = 136**	**Total N = 373**
A. Demographic Characteristics of Participants									
Age (years)	34.5 (8.9)	31.4 (6.5)	33.1 (8.1)	49.3 (11.4)	41.8 (10.5)	46.9 (11.6)	44.9 (12.7)	37.5 (10.4)	42.2 (12.4)
p-value [2]		**0.032**			**<0.001**			**<0.001**	
Pain duration (years)	11.7 (10.7)	13.6 (9.3)	12.6 (10.1)	24.3 (12.94)	21.1 (12.1)	23.3 (12.8)	20.7 (13.6)	17.9 (11.6)	19.7 (12.9)
p-value [2]		0.287			0.066			**0.046**	
Income									
Less than $20,000	4 (6.1%)	3 (5.2%)	7 (5.6%)	8 (4.7%)	13 (16.7%)	21 (8.4%)	12 (5.1%)	16 (11.8%)	28 (7.5%)
$20,000–$34,999	7 (10.6%)	7 (12.1%)	14 (11.3%)	11 (6.4%)	11 (14.1%)	22 (8.6%)	18 (7.6%)	18 (13.2%)	36 (9.7%)
$35,000–$49,999	9 (13.6%)	8 (13.8%)	17 (13.7%)	22 (12.9%)	6 (7.7%)	28 (11.2%)	31 (13.1%)	14 (10.3%)	45 (12.1%)
$50,000–$74,999	18 (27.3%)	11 (19.0%)	29 (23.4%)	19 (11.1%)	14 (17.9%)	33 (13.3%)	37 (15.6%)	25 (18.4%)	62 (16.6%)
$75,000–$99,999	9 (13.6%)	10 (17.2%)	19 (15.3%)	25 (14.6%)	11 (14.1%)	36 (14.5%)	34 (14.3%)	21 (15.4%)	55 (14.7%)
$100,000 or more	16 (24.2%)	13 (22.4%)	29 (23.4%)	62 (36.3%)	16 (20.5%)	78 (31.3%)	78 (32.9%)	29 (21.3%)	107 (28.7%)
p-value [2]		0.944			**0.002**			**0.024**	
Employment									
Full-time	43 (65.2%)	35 (60.3%)	78 (62.9%)	79 (46.2%)	28 (35.9%)	107 (43.0%)	122 (51.5%)	63 (46.3%)	185 (49.6%)
Part-time	5 (7.6%)	3 (5.2%)	8 (6.5%)	19 (11.1%)	14 (17.9%)	33 (13.3%)	24 (10.1%)	17 (12.5%)	41 (11.0%)
Freelancer	2 (3.0%)	0 (0%)	2 (1.6%)	10 (5.8%)	4 (5.1%)	14 (5.6%)	12 (5.1%)	4 (2.9%)	16 (4.3%)
Unemployed	7 (10.8%)	5 (9.6%)	12 (10.3%)	10 (6.5%)	7 (9.6%)	17 (7.5%)	17 (7.7%)	12 (9.6%)	29 (7.8%)
Student	2 (3.0%)	4 (6.9%)	6 (4.8%)	3 (1.8%)	1 (1.3%)	4 (1.6%)	5 (2.1%)	5 (3.7%)	10 (2.7%)
Retired	2 (3.0%)	0 (0%)	2 (1.6%)	23 (13.5%)	3 (3.8%)	26 (10.4%)	25 (10.5)	3 (2.2%)	28 (7.5%)
Disabled	4 (6.1%)	5 (8.6%)	9 (7.3%)	11 (6.4%)	16 (20.5%)	27 (10.8%)	15 (6.3%)	21 (15.4%)	36 (9.7%)
p-value [2]		0.653			**0.010**			**0.010**	
Education									
High school or less	6 (9.1%)	11 (19.0%)	17 (13.7%)	11 (6.4%)	4 (5.1%)	15 (6.0%)	17 (7.2%)	15 (11.0%)	32 (8.6%)
Some college	11 (16.7%)	18 (31.0%)	29 (23.4%)	26 (15.2%)	17 (21.8%)	43 (17.3%)	37 (15.6%)	35 (25.7%)	72 (19.3%)
Associate degree	9 (13.6%)	4 (6.9%)	13 (10.5%)	12 (7.0%)	14 (17.9%)	26 (10.4%)	21 (8.9%)	18 (13.2%)	39 (10.5%)
Bachelor's degree	25 (37.9%)	14 (24.1%)	39 (31.5%)	56 (32.7%)	24 (30.8%)	80 (32.1%)	81 (34.2%)	38 (27.9%)	119 (31.9%)
Masters, Prof, Doc	14 (21.2%)	5 (8.6%)	19 (15.3%)	50 (29.2%)	14 (17.9%)	64 (25.7%)	64 (27.0%)	19 (14.0%)	83 (22.3%)
p-value [2]		**0.025**			**0.038**			**0.004**	

Table 1. *Cont.*

	Clinic Group Participants			EA Group Participants			Total Sample		
Marijuana Use:	**Non-Users N = 66**	**Users N = 58**	**Total N = 124**	**Non-Users N = 171**	**Users N = 78**	**Total N = 249**	**Non-Users N = 237**	**Users N = 136**	**Total N = 373**
Relationship Status									
Married/Dom par	34 (51.5%)	26 (44.8%)	102 (82.3%)	102 (59.6%)	46 (59.0%)	148 (59.4%)	136 (57.4%)	72 (52.9%)	208 (55.8%)
Separated	0 (0%)	2 (3.4%)	2 (1.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (1.5%)	2 (0.5%)
Divorced	5 (7.6%)	3 (5.2%)	8 (6.5%)	22 (12.9%)	12 (15.4%)	34 (13.7%)	27 (11.5%)	15 (11.0%)	42 (11.3%)
Widowed	2 (3.0%)	0 (0%)	2 (1.6%)	4 (2.3%)	0 (0%)	4 (1.6%)	6 (2.5%)	0 (0%)	6 (1.6%)
Single	23 (34.8%)	21 (36.2%)	44 (35.5%)	26 (15.2%)	14 (17.9%)	40 (16.1%)	49 (20.7%)	35 (25.7%)	84 (22.5%)
p-value [2]		0.347			0.517			0.083	
Age of Children (years)									
All children ≥ 18	9 (13.6%)	4 (6.9%)	13 (10.5%)	41 (24.0%)	9 (11.5%)	50 (20.1%)	50 (21.1%)	13 (9.6%)	63 (16.9%)
Some children < 18	20 (30.3%)	16 (27.6%)	36 (29.0%)	46 (26.9%)	23 (29.5%)	69 (27.7%)	66 (27.8%)	39 (28.7%)	105 (28.2%)
No children	36 (54.5%)	32 (55.2%)	68 (54.8%)	67 (39.2%)	40 (51.3%)	107 (43.0%)	103 (43.5%)	72 (52.9%)	175 (46.9%)
p-value [2]		0.556			**0.05**			**0.014**	
Sexual Orientation									
Heterosexual	59 (89.4%)	43 (74.1%)	102 (82.3%)	147 (86.0%)	59 (75.6%)	206 (82.7%)	206 (86.9%)	102 (75%)	308 (82.6%)
Homosexual	0 (0%)	1 (1.7%)	1 (0.8%)	3 (1.8%)	2 (2.6%)	5 (2.0%)	3 (1.3%)	3 (2.2%)	6 (1.6%)
Bisexual	3 (4.5%)	7 (12.1%)	10 (8.1%)	2 (1.2%)	7 (9.0%)	9 (3.6%)	5 (2.1%)	14 (10.3%)	19 (5.1%)
Pansexual	0 (0%)	1 (1.7%)	1 (0.8%)	0 (0%)	3 (3.8%)	3 (1.2%)	0 (0%)	4 (2.9%)	4 (1.1%)
Other	0 (0%)	0 (0%)	1 (0.8%)	2 (1.2%)	1 (1.3%)	3 (1.2%)	3 (1.3%)	1 (0.7%)	4 (1.1%)
p-value [2]		0.191			**0.003**			**<0.001**	
Race/Ethnicity									
White	45 (68.2%)	37 (63.8%)	82 (66.1%)	128 (74.9%)	62 (79.5%)	190 (76.3%)	173 (73.0%)	99 (72.8%)	272 (72.9%)
Hispanic	11 (16.7%)	8 (13.8%)	19 (15.3%)	10 (5.8%)	5 (6.4%)	15 (6.0%)	21 (8.9%)	13 (9.6%)	34 (9.1%)
Black	3 (4.5%)	5 (8.6%)	8 (6.5%)	10 (5.8%)	3 (3.8%)	13 (5.2%)	13 (5.5%)	8 (5.9%)	21 (5.6%)
Native Am.	1 (1.5%)	1 (1.7%)	2 (1.6%)	0 (0%)	0 (0%)	0 (0%)	1 (0.4%)	1 (0.7%)	2 (0.5%)
Hawaiian/Pac Isla	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1.3%)	1 (0.4%)	0 (0%)	1 (0.7%)	1 (0.3%)
Multi-racial	3 (4.5%)	1 (1.7%)	4 (3.2%)	4 (2.3%)	1 (1.3%)	5 (2.0%)	7 (3.0%)	2 (1.5%)	9 (2.4%)
Other	1 (1.5%)	0 (0%)	1 (0.8%)	0 (0%)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	1 (0.3%)
p-value [2]		0.770			0.563			0.766	

Table 1. *Cont.*

	Clinic Group Participants			EA Group Participants			Total Sample		
Marijuana Use:	**Non-Users N = 66**	**Users N = 58**	**Total N = 124**	**Non-Users N = 171**	**Users N = 78**	**Total N = 249**	**Non-Users N = 237**	**Users N = 136**	**Total N = 373**
A. Marijuana and Other Substance Use among Participants.									
Has used marijuana for pain relief?									
No, never	-	-	67 (54.0%)	-	-	167 (67.1%)	-	-	234 (62.7%)
Yes, in past	-	-	26 (21.0%)	-	-	28 (11.2%)	-	-	54 (14.5%)
Yes, currently	-	-	29 (23.4%)	-	-	38 (15.3%)	-	-	67 (18.0%)
Possession of medical marijuana card?									
Never	65 (98.5%)	26 (44.8%)	91 (73.4%)	155 (90.6%)	57 (73.1%)	212 (85.1%)	220 (92.8%)	83 (61.0%)	303 (81.2%)
In the past	1 (1.5%)	11 (19.0%)	12 (9.7%)	2 (1.2%)	7 (9.0%)	9 (3.6%)	3 (1.3%)	18 (13.2%)	21 (5.6%)
Yes, currently	0 (0%)	19 (32.8%)	19 (15.3%)	0 (0%)	13 (16.7%)	13 (5.2%)	0 (0%)	32 (23.5%)	32 (8.6%)
Legal status of marijuana where participant lives									
Not legal	4 (6.1%)	1 (1.7%)	5 (4.0%)	35 (20.5%)	13 (16.7%)	48 (19.3%)	39 (16.5%)	14 (10.3%)	53 (14.2%)
Medicinal legal	53 (80.3%)	53 (91.4%)	106 (85.5%)	52 (30.4%)	28 (35.9%)	80 (32.1%)	105 (44.3%)	81 (59.6%)	186 (49.9%)
Recreational legal	1 (1.5%)	0 (0%)	1 (0.8%)	37 (21.6%)	33 (42.3%)	70 (28.1%)	38 (16.0%)	33 (24.3%)	71 (19.0%)
Use of CBD alone [3]	9 (13.6%)	48 (82.8%)	57 (46.0%)	21 (12.3%)	51 (65.4%)	72 (28.9%)	30 (12.7%)	99 (72.8%)	129 (34.6%)
p-value [2]		**<0.001**			**<0.001**			**<0.001**	
History of Tobacco Use	18 (27.3%)	28 (48.3%)	46 (37.1%)	40 (23.4%)	35 (44.9%)	75 (30.1%)	58 (24.5%)	63 (46.3%)	121 (32.4%)
p-value [2]		**0.034**			**0.001**			**<0.001**	
Recreational Drug Use	7 (10.6%)	20 (34.5%)	27 (21.8%)	23 (13.5%)	40 (51.2%)	63 (25.3%)	30 (12.7%)	60 (44.1%)	90 (24.1%)
p-value [2]					**<0.001**			**<0.001**	
Alcohol Use	58 (87.9%)	49 (84.5%)	107 (86.3%)	137 (80.1%)	66 (84.6%)	203 (81.5%)	195 (82.3%)	115 (84.6%)	310 (83.1%)
p-value [2]		0.538			0.828			0.183	

Table 1. *Cont.*

	Clinic Group Participants			EA Group Participants			Total Sample		
Marijuana Use:	**Non-Users N = 66**	**Users N = 58**	**Total N = 124**	**Non-Users N = 171**	**Users N = 78**	**Total N = 249**	**Non-Users N = 237**	**Users N = 136**	**Total N = 373**
A. Comorbidities of Participants.									
Allergies	33 (50.0%)	24 (41.4%)	57 (46.0%)	83 (48.5%)	42 (53.8%)	125 (50.2%)	116 (48.9%)	66 (48.5%)	182 (48.8%)
p-value [2]		0.337			0.437			0.938	
Arthritis	10 (15.2%)	5 (8.6%)	15 (12.1%)	48 (28.1%)	21 (25.9%)	69 (27.7%)	58 (24.5%)	26 (19.1%)	84 (22.5%)
p-value [2]		0.266			0.851			0.233	
Asthma	10 (15.2%)	12 (20.7%)	22 (17.7%)	27 (15.8%)	12 (15.4%)	39 (15.7%)	37 (15.6%)	24 (17.6%)	61 (16.4%)
p-value [2]		0.421			0.935			0.609	
Blood pressure	4 (6.1%)	2 (3.4%)	6 (4.8%)	30 (17.5%)	13 (16.7%)	43 (17.3%)	34 (14.3%)	15 (11.0%)	49 (13.1%)
p-value [2]		0.49			0.865			0.361	
Cancer	1 (1.5%)	0 (0%)	1 (0.8%)	12 (7.0%)	2 (2.6%)	14 (5.6%)	13 (5.5%)	2 (1.5%)	15 (4.0%)
p-value [2]		0.347			0.157			0.057	
Cholesterol	1 (1.5%)	2 (3.4%)	3 (2.4%)	38 (22.2%)	6 (7.7%)	44 (17.7%)	39 (16.5%)	8 (5.9%)	47 (12.6%)
p-value [2]		0.485			**0.005**			**0.003**	
Depression	18 (27.3%)	24 (41.4%)	42 (33.9%)	62 (36.3%)	33 (42.3%)	95 (38.2%)	80 (33.8%)	57 (41.9%)	137 (36.7%)
p-value [2]		0.098			0.362			0.116	
Diabetes	1 (1.5%)	0 (0%)	1 (0.8%)	7 (4.1%)	4 (5.1%)	11 (4.4%)	8 (3.4%)	4 (2.9%)	12 (3.2%)
p-value [2]		0.347			0.712			0.819	
Digestion Problems	14 (21.2%)	15 (25.9%)	29 (23.4%)	57 (33.3%)	24 (30.8%)	81 (32.5%)	71 (30.0%)	39 (28.7%)	110 (29.5%)
p-value [2]		0.542			0.689			0.794	
Eyesight	5 (7.6%)	8 (13.8%)	13 (10.5%)	18 (10.5%)	9 (11.5%)	27 (10.8%)	23 (9.7%)	17 (12.5%)	40 (10.7%)
p-value [2]		0.259			0.812			0.401	
Fibromyalgia	8 (12.1%)	5 (8.6%)	13 (10.5%)	21 (12.3%)	15 (19.2%)	36 (14.5%)	29 (12.2%)	20 (14.7%)	49 (13.1%)
p-value [2]		0.526			0.148			0.497	
Headaches	29 (43.9%)	26 (44.8%)	55 (44.4%)	60 (35.1%)	33 (42.3%)	93 (37.3%)	89 (37.6%)	59 (43.4%)	148 (39.7%)
p-value [2]		0.921			0.275			0.268	

Table 1. *Cont.*

	Clinic Group Participants			EA Group Participants			Total Sample		
Marijuana Use:	**Non-Users N = 66**	**Users N = 58**	**Total N = 124**	**Non-Users N = 171**	**Users N = 78**	**Total N = 249**	**Non-Users N = 237**	**Users N = 136**	**Total N = 373**
Hearing	0 (0%)	2 (3.4%)	2 (1.6%)	11 (6.4%)	1 (1.3%)	12 (4.8%)	11 (4.6%)	3 (2.2%)	14 (3.8%)
p-value [2]		0.128			0.078			0.234	
Heart disease	0 (0%)	0 (0%)	0 (0%)	7 (4.1%)	4 (5.1%)	11 (4.4%)	7 (3.0%)	4 (2.9%)	11 (2.9%)
p-value [2]		NA			0.712			0.995	
Infectious disease	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
p-value [2]		NA			NA			NA	
Obesity	8 (12.1%)	2 (3.4%)	10 (8.1%)	22 (12.9%)	12 (15.4%)	34 (13.7%)	30 (12.7%)	14 (10.3%)	44 (11.8%)
p-value [2]		0.077			0.591			0.496	
Sexual problems	8 (12.1%)	7 (12.1%)	15 (12.1%)	27 (15.8%)	9 (11.5%)	36 (14.5%)	35 (14.8%)	16 (11.8%)	51 (13.7%)
p-value [2]		0.993			0.376			0.416	
Sleep problems	13 (19.7%)	20 (34.5%)	33 (26.6%)	46 (26.9%)	31 (39.7%)	77 (30.9%)	59 (24.9%)	51 (37.5%)	110 (29.5%)
p-value [2]		0.063			**0.042**			**0.010**	
Skin problems	6 (9.1%)	4 (6.9%)	10 (8.1%)	24 (14.0%)	10 (12.8%)	34 (13.7%)	30 (12.7%)	14 (10.3%)	44 (11.8%)
p-value [2]		0.654			0.796			0.496	
Substance abuse	0 (0%)	1 (1.7%)	1 (0.8%)	1 (0.6%)	2 (2.6%)	3 (1.2%)	1 (0.4%)	3 (2.2%)	4 (1.1%)
p-value [2]		0.284			0.184			0.107	
Thyroid	12 (18.2%)	6 (10.3%)	18 (14.5%)	28 (16.4%)	10 (12.8%)	38 (15.3%)	40 (16.9%)	16 (11.8%)	56 (15.0%)
p-value [2]		0.216			0.470			0.183	
Other	11 (16.7%)	6 (10.3%)	17 (13.7%)	23 (13.5%)	18 (23.1%)	41 (16.5%)	34 (14.3%)	24 (17.6%)	58 (15.5%)
p-value [2]		0.0304			0.057			0.397	

[1] Distributions expressed as number and proportion (%) with specified level of categorical variable or mean and standard deviation of continuous variable for group; frequencies of some entries do not total 100% due to missing values. [2] *p*-values compare marijuana users vs. non-users in each group (Clinic, EA, Total) using independent sample *t*-test or Pearson's chi-squared test. [3] Use of CBD without use of THC.

Table 2. Multivariate model of associations of marijuana use for relief of endometriosis or chronic pelvic pain [1].

	Clinic Group		EA Group		Total Sample	
	Unadjusted OR (95% CI)	**Adjusted OR (95% CI)**	**Unadjusted OR (95% CI)**	**Adjusted OR (95% CI)**	**Unadjusted OR (95% CI)**	**Adjusted OR (95% CI)**
Age (years) [2]	**0.95 (0.90, 0.99)**	**0.92 (0.84, 0.99)**	**0.94 (0.91, 0.97)**	**0.91 (0.86, 0.95)**	**0.95 (0.93, 0.97)**	**0.93 (0.90, 0.96)**
Recreational drug use	**5.18 (1.98, 13.56)**	2.71 (0.74, 9.88)	**6.96 (3.67, 13.18)**	**8.60 (3.41, 21.71)**	**5.85 (3.47, 9.84)**	**5.77 (2.90, 11.49)**
Tobacco use	**3.05 (1.41, 6.58)**	**3.28 (1.06, 10.16)**	**2.67 (1.49, 4.79)**	0.95 (0.40, 2.26)	**2.86 (1.80, 4.53)**	1.50 (0.80, 2.81)
Sleep Problems	2.15 (0.95, 4.84)	**4.53 (1.26, 16.29)**	**1.79 (1.02, 3.16)**	**3.46 (1.46, 8.23)**	**1.81 (1.15, 2.85)**	**2.65 (1.39, 5.04)**
Legal status of Marijuana where participant lives [3]	Ref	Ref	Ref	Ref	Ref	Ref
Not legal	4.0 (0.43, 36.98)	12.43 (0.70, 221)	1.45 (0.66, 3.18)	**3.32 (1.15, 9.60)**	**2.15 (1.09, 4.23)**	**3.04 (1.29, 7.17)**
Medicinal legal	NA [4]	NA [4]	**2.40 (1.09, 5.30)**	**7.76 (2.44, 24.63)**	**2.42 (1.12, 5.22)**	**7.13 (2.57, 19.81)**
Recreational legal						
Education						
High school or less	3.27 (0.99, 10.77)	**6.07 (1.12, 32.87)**	0.85 (0.25, 2.93)	0.82 (0.14, 4.98)	1.88 (0.85, 4.16)	**3.07 (1.06, 8.88)**
Some college	**2.92 (1.08, 7.91)**	**4.17 (1.12, 15.60)**	1.53 (0.70, 3.32)	1.20 (0.36, 4.03)	**2.02 (1.11, 3.68)**	**2.48 (1.10, 5.61)**
Associate degree	Ref	Ref	Ref	Ref	Ref	Ref
Bachelor's degree	0.79 (0.21, 3.05)	0.78 (0.12, 15.60)	**2.72 (1.10, 6.75)**	2.40 (0.69, 8.32)	1.83 (0.87, 3.82)	1.57 (0.60, 4.12)
Master's, Prof, Doc	0.64 (0.19, 2.15)	1.14 (0.28, 4.67)	0.65 (0.31, 1.40)	1.05 (0.39, 2.82)	0.63 (0.33, 1.20)	1.13 (0.52, 2.46)
Employment						
Full-time	Ref	Ref	Ref	Ref	Ref	Ref
Part-time	0.74 (0.17, 3.30)	0.68 (0.09, 4.98)	2.08 (0.92, 4.69)	**6.03 (1.75, 20.73)**	1.37 (0,69, 2.74)	2.11 (0.82, 5.43)
Freelancer	NA [4]	NA [4]	1.13 (0.33, 3.89)	1.25 (0.27, 5.88)	0.65 (0.20, 2.08)	0.61 (0.15, 2.51)
Unemployed	0.88 (0.26, 3.01)	0.50 (0.07, 3.69)	1.98 (0.69, 5.69)	2.34 (0.52, 10.52)	1.37 (0.62, 3.04)	0.71 (0.24, 2.09)
Student	2.46 (0.43, 14.21)	0.93 (0.06, 14.32)	0.94 (0.09, 9.42)	0.34 (0.03, 4.47)	1.94 (0.54, 6.94)	0.65 (0.13, 3.12)
Retired	NA [4]	NA [4]	0.37 (0.10, 1.32)	2.75 (0.38, 19.91)	0.23 (0.07, 0.80)	0.81 (0.15, 4.43)
Disabled	1.54 (0.38, 6.16)	1.47 (0.23, 9.55)	**4.10 (1.70, 9.90)**	**9.21 (2.34, 35.94)**	**2.71 (1.31, 5.62)**	**3.49 (1.27, 9.62)**

[1] The adjusted odds ratio model includes the following variables: age (years), lifetime recreation drug use, lifetime tobacco use, sleep problems, participant-perceived state legality of marijuana, education, and employment. [2] Per one year increase in age. [3] Participant-perceived state legality of marijuana; some patients may have not correctly identified the legality of marijuana in their state. [4] Sample size was too sparse for analysis.

Characteristics of women who reported marijuana use are provided in Table 3.

Table 3. Characteristics of marijuana use among marijuana users only.

Number (%) of with Feature or Mean (SD) Value of Feature				
Variable		**Clinic Group N = 58**	**EA Group N = 78**	**Total Sample N = 136**
Duration of marijuana use (years)		4.9 (6.6)	9.8 (13.2)	7.6 (11.0)
	p-value [1]		**0.023**	
Marijuana use frequency				
<once per month		12 (20.7%)	13 (16.7%)	25 (18.4%)
Monthly		5 (8.6%)	5 (6.4%)	10 (7.4%)
Weekly		5 (8.6%)	8 (10.3%)	13 (9.6%)
Several times per week		4 (6.9%)	11 (14.1%)	15 (11.0%)
Daily		9 (15.5%)	10 (12.8%)	19 (14.0%)
Several times per day		13 (22.4%)	11 (14.1%)	24 (17.6%)
	p-value [1]		0.581	
Effectiveness of marijuana use				
Not effective		5 (8.6%)	9 (11.5%)	14 (10.3%)
Slightly effective		9 (15.5%)	16 (20.5%)	25 (18.4%)
Moderately effective		13 (22.4%)	22 (28.2%)	35 (25.7%)
Very effective		31 (53.4%)	31 (39.7%)	62 (45.6%)
	p-value [1]		0.470	
Most effective route of marijuana				
Smoke/inhale		14 (24.1%)	25 (32.1%)	39 (28.7%)
Vaporize		4 (6.9%)	2 (2.6%)	6 (4.4%)
Edibles		15 (25.9%)	21 (26.9%)	36 (26.5%)
Prescription THC medications		0 (0.0%)	3 (3.8%)	3 (2.2%)
Transdermal medications		5 (8.6%)	3 (3.8%)	8 (5.9%)
Vaginal suppository		1 (1.7%)	1 (1.3%)	2 (1.5%)
Vape pen		5 (8.6%)	3 (3.8%)	8 (5.9%)
Other route		4 (6.9%)	0 (0.0%)	4 (2.9%)
	p-value [1]		0.103	
Marijuana use in pregnancy				
No use in pregnancy		45 (77.6%)	53 (67.9%)	98 (72.1%)
Use in early pregnancy + stopped upon discovering pregnancy		3 (5.2%)	3 (3.8%)	6 (4.4%)
Continued use throughout pregnancy		1 (1.7%)	3 (3.8%)	4 (2.9%)
	p-value [1]		0.693	
Legal status of marijuana in state				
Neither recreational nor medicinal		1 (1.9%)	13 (17.6%)	14 (10.3%)
Medicinal is legal, recreational is not		53 (98.1%)	28 (37.8%)	81 (59.6%)
Currently has a physician-issued medical marijuana card		19 (35.8%)	5 (17.9%)	24 (29.7%)
Had physician-issued card in the past but no longer		10 (18.9%)	1 (3.5%)	11 (13.6%)
Never had physician-issued card		24 (45.3%)	22 (78.6%)	46 (56.8%)
	p-value [1]		0.005	
Recreation and medicinal are legal		0 (0.0%)	33 (34.6%)	33 (24.3%)
Currently has a physician-issued medical marijuana card		0	8 (24.2%)	8 (24.2%)
Had physician-issued card in the past but no longer		0	5 (15.2%)	5 (15.2%)
Never had physician-issued card		0	20 (60.6%)	20 (60.6%)
	p-value [1]		NA	
Legal marijuana use among current users only		Clinic Group N = 29	EA Group N = 38	Total Sample N = 67
Neither recreational nor medicinal is legal in state		0 (0%)	6 (16.7%)	6 (8.9%)
Medicinal use is legal, recreational is not in state		29 (100%)	15 (38.9%)	44 (65.7%)
Currently has a physician-issued medical marijuana card		19 (65.5%)	4 (28.6%)	23 (52.3%)
Had physician-issued card in the past but no longer		3 (10.3%)	0 (0%)	3 (6.8%)
Never had physician-issued card		7 (24.1%)	11 (78.6%)	18 (40.9%)
Recreation and medicinal are legal in state		0 (0.0%)	17 (44.4%)	17 (25.4%)
Currently has a physician-issued medical marijuana card		0	7 (41.2%)	7 (41.2%)
Had physician-issued card in the past but no longer		0	3 (17.6%)	3 (17.6%)
Never had physician-issued card		0	7 (41.2%)	7 (41.2%)

[1] *p*-values calculated are the comparisons of clinic group and EA group using independent sample *t*-test or Pearson's chi-squared test.

The majority of participants in the clinical group lived in Arizona, where only medical marijuana was legal at the time of the survey; all users in this group correctly identified the legal status of marijuana in their state. Within the EA group, the legal status of marijuana in the participant's state varied: 17.6% reported living where marijuana use was not legal for any purpose, 37.8% where legal only for medical use, and 34.6% where legal for recreational use. Accordingly, sources for marijuana differed between the two survey populations (Figure 1).

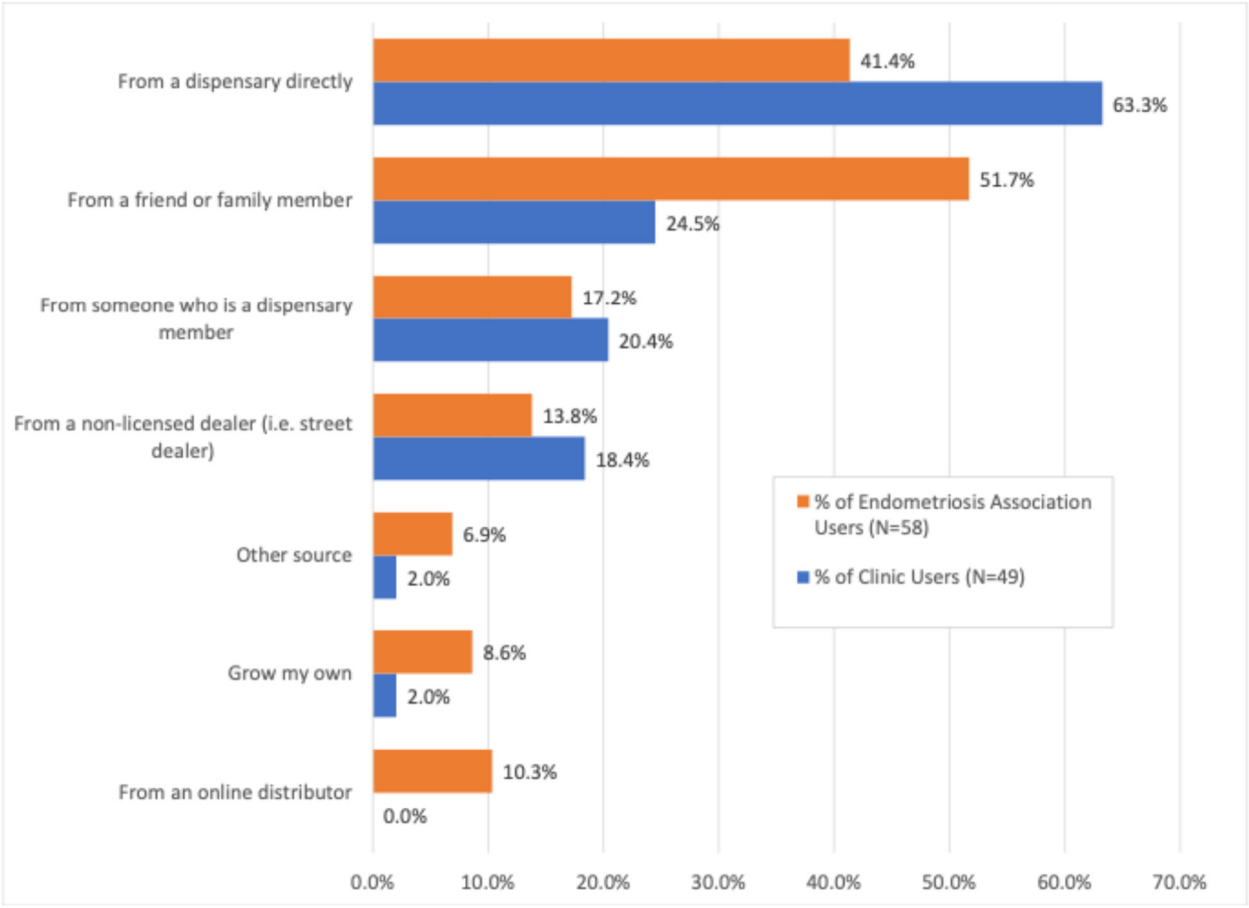

Figure 1. Cannabis source.

Those in the clinic population most often obtained it directly through a dispensary (63.3%), while those in the EA group were more likely to obtain it from a friend or family member (51.7%, vs. 41.4% from a dispensary directly). Large proportions in both groups (46.4% clinic, 74.0% EA) had never obtained a physician-issued medical marijuana card. Among users residing in a state where only medical marijuana was legal, 52.3% (n = 23) of current users reported having a medical marijuana card.

Frequency of marijuana use had a bimodal distribution (Table 3): most common responses were several times per day (22.4% clinic, 14.1% EA users) and less than once per month (20.7% clinic, 16.7% EA users). Use throughout pregnancy was uncommon, reported by only 1 clinic user (1.7%) and 3 EA users (3.8%). Among marijuana users, 34.6% (n = 47) reported having undergone hysterectomy to address their endometriosis pain.

Although participants reported using marijuana to treat a variety of symptoms, they most often reported use for treatment of constant pelvic pain (86.3% clinic, 75.4% EA users) (Figure 2).

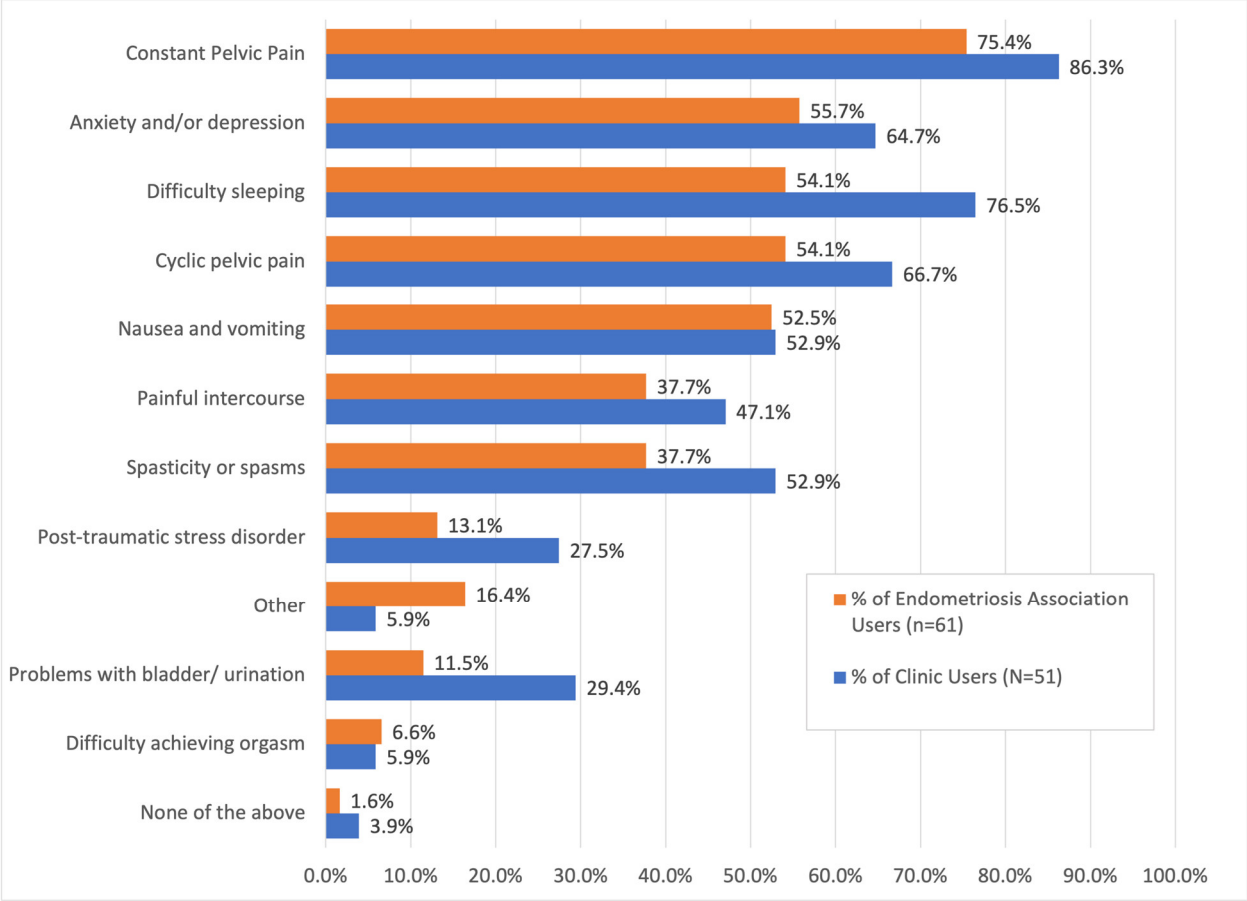

Figure 2. Symptoms treated with cannabis.

Numerous respondents identified multiple reasons for use, anxiety or depression (64.7% clinic, 55.7% EA users), and difficulty sleeping (76.5% clinic, 54.1% EA users) were frequently noted. Reasons for initiating use varied between the populations (Figure 3).

Lack of symptom relief from other clinical management was the single most cited motivation for initiation (55.1% clinic, 39.7% EA users). The recommendation to try marijuana was reported to come predominantly from social contacts—friends, family, or other patients (89.8% clinic, 82.8% EA users). Recommendation of a physician was less frequently reported (12.2% clinic, 20.7% EA users).

The majority of users reported marijuana to be very or moderately effective for relief of endometriosis/chronic pelvic pain (75.9% clinic, 68.0% EA users). Notably, marijuana was most often considered very effective (53.4% clinic, 39.7% EA users). Routes of administration reported to be most effective were smoked/inhaled (29.2% clinic, 43.1% EA users) and edibles (31.3% clinic, 36.2% EA users). Use by more than one route was reported by 75.7% of users. Among all women who reported using marijuana, those who obtained it directly from a dispensary tended to report greater effectiveness (moderately effective or very effective vs. not effective or slightly effective; total sample, $p = 0.009$; clinic, $p = 0.006$; EA, $p = 0.374$) However, within the EA group, those who obtained it from friends or family tended to report greater effectiveness (moderately effective or very effective vs. not effective or slightly effective; total sample, $p = 0.097$, clinic, $p = 0.403$, EA, $p = 0.005$).

The most frequently reported side effects of marijuana were comparatively mild. Most users reported experiencing dry mouth (65.9% clinic, 63.5% EA users) and increased appetite (61.0% clinic, 71.2% EA users) (Figure 4).

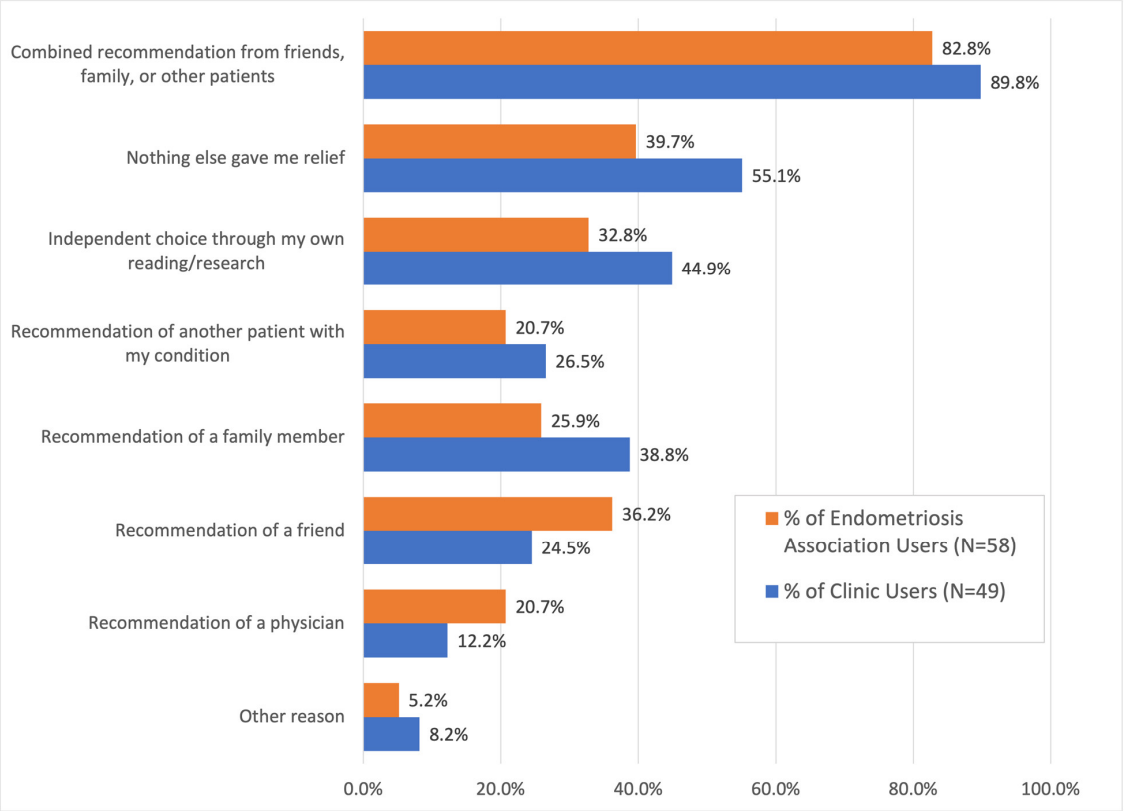

Figure 3. Reason for trying cannabis.

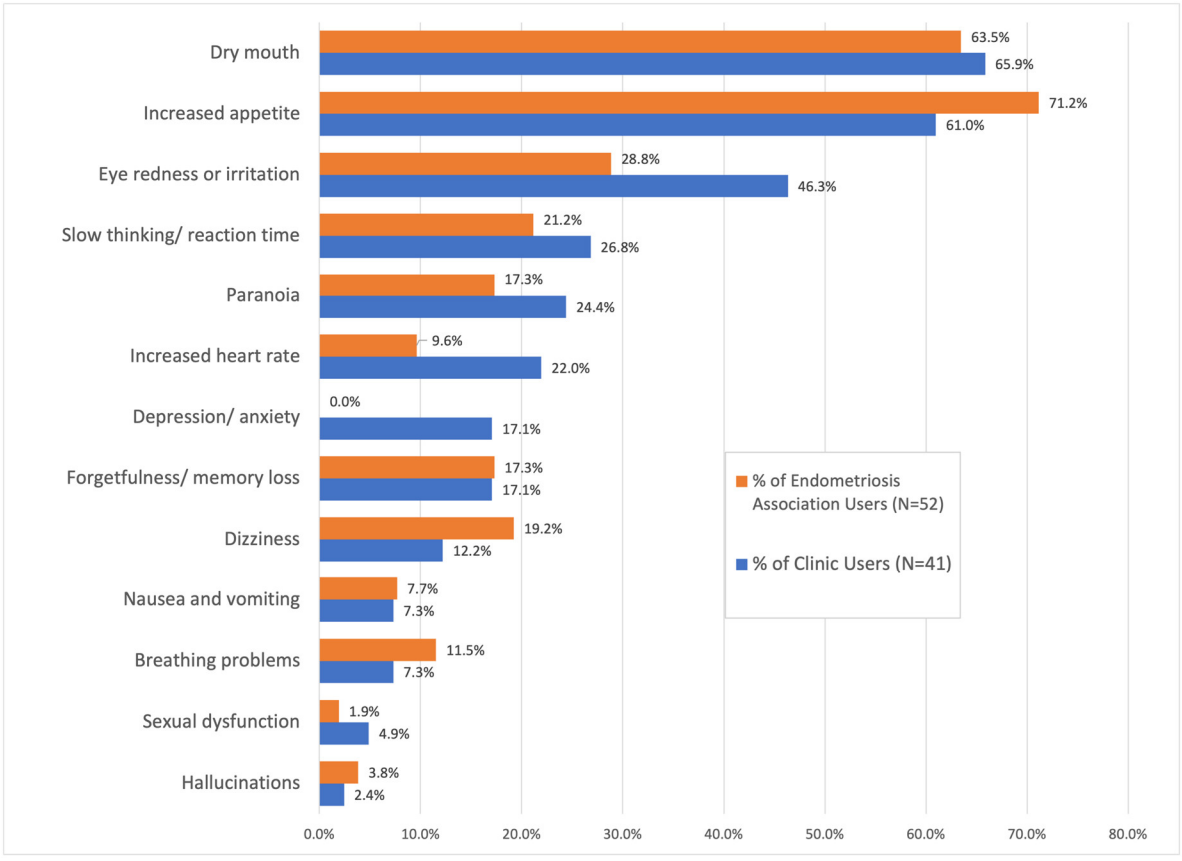

Figure 4. Side effects of cannabis use.

Among the 54 women who stopped using marijuana, discontinuation was attributed to several reasons (Figure 5). Collectively, non-clinical factors such as employment or legal risk, social stigma, or obstacles to access were most commonly cited. Lack of effectiveness for symptom control was cited by 42.9% of clinic past users and 30.4% of EA past users. Unpleasant side effects were cited by 23.8% of clinic past users and 26.1% of EA past users. The majority of past users (64.8%) attributed discontinuation to only non-clinical factors, with neither lack of symptom control nor unpleasant side effects cited.

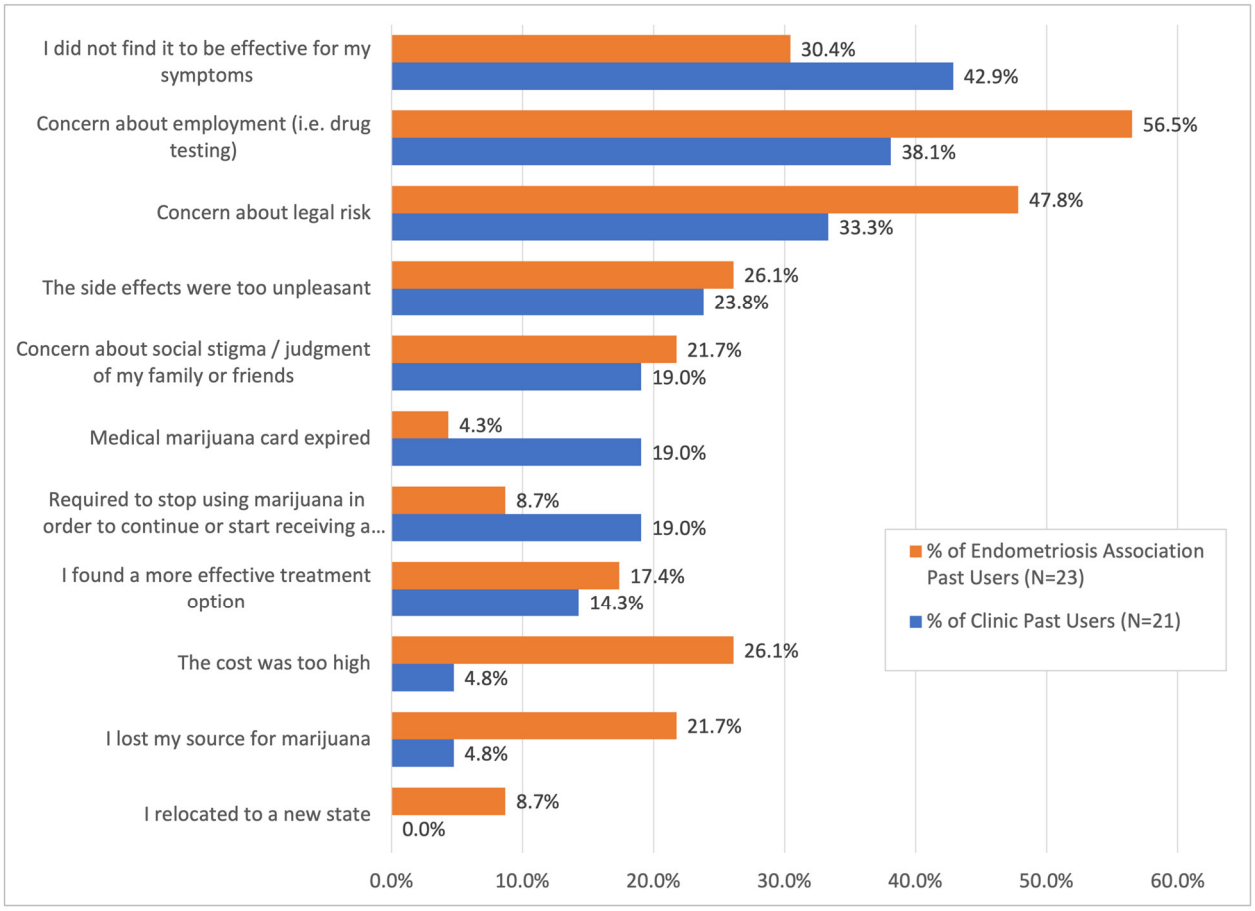

Figure 5. Reasons for discontinuing cannabis.

Use of CBD without THC was reported by 27.8% (67 of 240) EA participants, with half (50%, 34 of 67) reporting CBD to be very or moderately effective. Use was reported by 46.0% of clinic participants (57 of 124), with the majority (64.9%, 37 of 57) reporting CBD to be very or moderately effective. CBD was most likely to be reported as moderately effective (31.4% of EA participants, 36.8% of clinic participants). Of the 127 patients reporting cannabidiol use, 99 (78%) also reported marijuana use.

4. Discussion

Marijuana use for self-management of endometriosis pain was more common among younger survey participants and in states with less legal restrictions; this finding corroborates those of earlier surveys and suggests that prevalence of use may continue to increase with broader decriminalization of marijuana and as a result of generational differences in attitudes towards marijuana. Illegal use of marijuana is common, reported by 52.3% of current users within a state where only medicinal use is legal—but this is lower than 80% of users reported in a previous Florida-based survey [13].

Two predominant patterns of marijuana use were reported: as a rescue pain medication for use once per month, which may represent a strategy for dealing with pain associated with menses or other painful flares, or as a continuous medication used daily and multiple times per day. Future interventional clinical studies may benefit from focusing on the first pattern of use, as lower risks from marijuana use may be anticipated with more sparing use. Beyond the management of pelvic pain, users indicated improved mood and sleep as additional symptoms treated with marijuana, so future interventional studies could include these as secondary outcomes.

Dissatisfaction with symptom relief from other therapies was the most cited reason for initiating marijuana, highlighting patients' experience of refractory pain symptoms with use of conventional therapies for management of endometriosis. Initiation of marijuana is predominantly due to advisement by lay person social networks outside of the medical establishment.

Discontinuation of marijuana use was reported by approximately half of users, despite most reporting effective relief of their pelvic pain symptoms with marijuana. While a minority of past users discontinued marijuana due to clinical factors of poor symptom relief or unpleasant side effects, the majority of past users exclusively cited non-clinical reasons for discontinuation: loss of access, social taboo, legal/employment risk. This result mirrors the findings from our multivariate analysis that legal access to marijuana is the factor most associated with increased marijuana use. Together, these results identify social and legal factors as determinants of marijuana use among women with endometriosis and pelvic pain. Our findings reflect those of an international survey of 1179 endometriosis patients reporting current or past marijuana use, in which legality, access, and employment concerns were identified as reasons for discontinuation of marijuana, with a higher proportion of survey respondents reporting marijuana use from countries with legal access [20]. These concerns were shared by 114 marijuana users from a survey of German-speaking European patients: structural issues of access, cost, and stigmatization were expressed as factors impacting marijuana use [21]. Further evidence for the impact of marijuana legality on use comes from a retrospective chart review in Canada following legalization of recreational marijuana: an increase in the fraction of chronic pelvic pain patients self-identifying as marijuana users occurred, from 13.3% prior to legalization to 21.5% after legalization [22].

Low participation is a limitation of our survey, and our estimates of prevalence of marijuana use may be subject to response bias if those who did or did not use marijuana were less likely to participate in the survey. However, the total number of marijuana users was large, and it seems less likely that survey participation would be influenced by reasons for use, or consequences of use; therefore, factors found by this study to be associated with marijuana use are unlikely to be spurious consequences of response bias.

Concern about legal risk and social taboo likely contributed to low participation and to missing data, especially among the EA group; the clinic group may have had somewhat higher participation due to familiarity with and trust in the researchers and sponsoring institution. However, similar findings for each group suggest that erroneous conclusions due to response bias are unlikely.

A key methodological limitation was that the survey questionnaire was not formally validated through statistical methods. Another methodological limitation was that the diagnosis of endometriosis was not limited to cases with pathological confirmation. In the EA group, the endometriosis diagnosis was self-reported, and in the clinic group, the diagnosis may have been made clinically by a physician, without surgical confirmation. Although it seems unlikely that significant numbers of women without endometriosis would have been included, a small proportion of participants may have reported on their experience using marijuana for an alternative cause of pelvic pain.

Despite these limitations, participants provided their detailed impressions regarding motives for and patterns of use of cannabis products, perceived effectiveness, side effects, and reasons for discontinuation. This information can refine the development of experimental evidence regarding risks and benefits of using cannabinoid compounds for endometriosis in the remaining period of equipoise when randomized trials can still be undertaken.

5. Conclusions

Endometriosis is a common, incurable cause of chronic pelvic pain in women and many patients report dissatisfaction with available treatment options. Marijuana represents a unique and reportedly effective option for symptom management, but access is variable and limited by social and legal factors. Prevalence of marijuana use among endometriosis patients appears to be most determined by legal and social rather than clinical factors, with discontinuation common despite reported effectiveness.

Within the changing legal climate across the United States, our data suggest that the number of women who will try marijuana for management of endometriosis and pelvic pain is likely to increase in the future. Variability in legal access to this potentially beneficial treatment option contributes to inequities in chronic pain symptom relief among the diverse population of individuals affected by endometriosis.

In choosing to study the use of cannabis within a population containing young women and individuals with reproductive capacity, we recognize and do not seek to obscure the potential harms of cannabis use, including the unique morbidity associated with pre-natal use of cannabis. We also recognize the vulnerability of this population and the significant lifelong morbidity resulting from chronic, largely refractory pain that develops in the second or third decade of life. For a population whose care may be colored by bias related to fertility capacity and goals, we sought to objectively evaluate and present data on use of cannabis. Our data indicate a history of a sterilizing procedure among one third of cannabis users and use within pregnancy was rare.

There are now clinical guidelines from both the American College of Obstetrics and Gynecologists (ACOG) and the Society of Obstetrician and Gynaecologists of Canada (SOGC) addressing the use of cannabis for pelvic pain associated with endometriosis [23,24]. Both societies acknowledge that cannabis use for self-management of pain is common among patients and emphasize a need for better quality data before forming recommendations about cannabis use for chronic pelvic pain. They recommend that physicians be knowledgeable to counsel patients appropriately about potential risks and benefits of use.

Results of this observational study may help equip physicians to better counsel patients about the effects of marijuana on endometriosis-related pain symptoms and should inform future interventional, controlled studies to assess the impact of marijuana products on chronic pelvic pain symptoms in women with endometriosis. Future research including interventional trials could seek to minimize variability in marijuana strain, route, dose, and frequency of use, to better ascertain the relationship of these factors to effectiveness of symptom relief and adverse side effects. We recommend focusing on the pattern of marijuana use once per month, identified among a quarter of our survey population, as a lower risk context to explore these factors.

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Informed Consent Statement: The institutional IRB granted a waiver of consent to avoid any risk to privacy from linking de-identified data with identifiers that would be required to document consent. The survey introduction page included a statement of informed consent describing risks and benefits to participants, such that proceeding with the online survey implied consent.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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