

Article

Not peer-reviewed version

Understanding Pharmacy Students' Preparedness Towards Counseling Over Cannabis Use Disorder

[Sourab Ganna](#) , Jerusha Daggolu , [Sujit Sansgiry](#) *

Posted Date: 26 December 2023

doi: 10.20944/preprints202312.1833.v1

Keywords: Pharmacy education; counseling; Curriculum Development; Student Development; Cannabis education



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article

Understanding Pharmacy Students' Preparedness Towards Counseling Over Cannabis Use Disorder

Sourab Ganna ¹, Jerusha Daggolu ² and Sujit S. Sansgiry ^{2,*}

¹ Institution: Department of Pharmaceutical Health Outcomes and Policy

² College of Pharmacy, University of Houston, Houston, TX 77204

* Correspondence: Department of Pharmaceutical Health Outcomes and Policy, College of Pharmacy, University of Houston, Health and Biomedical Sciences Building 2, Office 4050, 4849 Calhoun Road, Houston, TX 77204-5047; Email: sansgiry@central.uh.edu; Tel. No. 832 842 8392

Abstract: The rise in cannabis use has caused significant concerns pharmacy students' abilities to counsel patients over cannabis. This study aims to understand pharmacy students' preparedness to counsel patients with cannabis use disorder (CUD) and evaluate the relationship between knowledge, attitudes towards medical cannabis (MC) and recreational cannabis (RC), and behavior intention (BI) to counsel over CUD. A cross-sectional survey was administered to pharmacy students. Descriptive analysis of sample characteristics were assessed with T-test and one-way ANOVA test. Pearson correlation and linear regression were conducted measuring the strength and direction of relationships. The average scores for knowledge, attitudes towards MC use and RC, and BI were 81% (SD 16%), 4.13 (SD 0.75), 3.28 (0.80), and 2.74 (1.00). Significant correlations were observed between knowledge-attitudes toward MC, knowledge-attitudes towards RC, and attitudes towards RC-BIs. Linear regression indicated attitudes towards MC use and RC, academic year, awareness of MC use legality, obtained knowledge, and past patient interaction were significantly associated with BI on confidence in counseling over CUD. There is a gap in students' BI to counsel. These findings emphasize the importance of a comprehensive curriculum and state policy and practice changes, enabling future pharmacists to address patient needs related to cannabis use confidently.

Keywords: pharmacy education; counseling; curriculum development; student development; cannabis education

1. Introduction

Cannabis, commonly known as marijuana, is a plant used for medicinal, recreational, and industrial purposes. Containing numerous active compounds, the most well-known being delta-9-tetrahydrocannabinol (THC), along with cannabidiol (CBD). Cannabis has gained significant attention recently due to its well-documented therapeutic benefits in managing various medical conditions, such as chronic pain, epilepsy, multiple sclerosis, and chemotherapy-related nausea [1–3]. However, the perception of cannabis within the medical community has been characterized by a complex mix of uncertainty, controversy, and optimism [4,5]. While many advocate for its use medically as a promising treatment option, others are more skeptical and emphasize the need for rigorous scientific evidence to support its effectiveness and safety [6]. As the landscape of cannabis-based medicine continues to evolve, it becomes more essential for healthcare providers, especially future pharmacists, to stay informed about the latest research and evidence-based guidelines to make informed patient decisions.

As much as 147 million, or 2.5%, of the world's population have used RC annually at least once, compared to only 0.2% consuming cocaine and 0.2% consuming opiates. [7] In the United States, RC is the most used federally illegal drug, with approximately 48.2 million people, or about 18%, users in 2019 [8,9]. About 30% of those using cannabis have cannabis use disorder [8]. For people who begin

using cannabis before age 18, the risk of developing cannabis use disorder is even more significant [10]. As per the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), CUD is defined as a problematic pattern of cannabis use leading to clinically significant impairment or distress followed by at least two other symptoms within 12 months [11]. Long-term or frequent cannabis use has been linked to an increased risk of psychosis or schizophrenia in some users [12,13].

Changes in state and federal legislation, practice guidelines, and facility policies may pose new challenges for pharmacists in addressing issues associated with cannabis use. Current and future pharmacists are critical in ensuring safe and effective medication management, especially with increased cannabis use. With MC gaining prominence, pharmacy curriculums nationwide may need to prepare students with the necessary knowledge and skills to handle CUD interventions. This includes understanding the pharmacology of cannabis and its cannabinoids, potential drug interactions, dosing guidelines, and counseling patients on its proper use and possible side effects. In addition, pharmacy students need to be educated about the legal and regulatory entities governing MC use in different jurisdictions to comply with local laws and ethical standards. By incorporating comprehensive cannabis education into pharmacy curriculums, future pharmacists may be able to confidently contribute to evidence-based medicine and patient care to facilitate informed decision-making over MC use and RC use.[11,14–16]

With the growing trend in state legalization and increased use of cannabis, pharmacy students and pharmacists are likely to be consulted by patients and other healthcare professionals on the safety, efficacy, and drug-drug interactions of cannabis. Furthermore, pharmacists are likely to be involved in policy developments and consulted on legal matters for the use of cannabis. With state policies and practices changing ever so rapidly, it is not unreasonable to assume pharmacists and other healthcare professionals will have to be capable of answering and making decisions regarding cannabis therapeutics and dispensations for patients. However, many pharmacy students believe they need more time to be ready to provide such a level of information to patients regarding safety, efficacy, and legal implications [17]. On the other hand, while current practicing pharmacists feel comfortable answering clinical questions, most would prefer further education to ensure proper safety and efficacy standards are met. [18] Literature in this area primarily has a sample of a single pharmacy school or a few schools and is descriptive. This study aims to understand pharmacy students' preparedness to counsel patients with Cannabis Use Disorder (CUD) and evaluate the relationship between knowledge, attitudes, and BI to counsel over CUD.

Materials and Methods:

Study Design and Population

A structured prospective cross-sectional survey was administered to professional pharmacy students in Accreditation Council for Pharmacy (ACPE) - accredited pharmacy schools across the USA with various levels of legalization of RC and MC within their respective states. The pharmacy students were either in the P1, P2, P3, or P4 years of their professional program at the time of administration of the survey. The survey was conducted between October 1, 2022 - April 30, 2023.

Sample Selection

A systematic sampling approach was utilized for the recruitment of participants. Inclusion criteria consisted of the student being at least 18 years old and a current pharmacy student attending an accredited college of pharmacy in the USA. 1-2 follow-up reminder emails were sent to help with the recruitment.

Instrument Design

A structured questionnaire with close-ended questions using predefined answers or a Likert scale was used to gather information about the sample characteristics, knowledge, attitudes towards MC use and RC use, and behavior intention to counsel over CUD. This survey was adapted from previous literature looking to assess knowledge and attitude towards medical marijuana, which was

then modified to fit the needs of this study [16]. The first section assesses knowledge about CUD. The second section included items on attitudes towards medical and recreational use of cannabis. The third section assessed BI toward counseling patients with CUD. The survey ended with the sample characteristics questions.

The knowledge section contained ten items to characterize the participants' overall understanding of CUD using a True-False scale. These ten items assessed the general knowledge, the diagnosis criteria, and the disease presentation of CUD, along with the pharmacokinetics of cannabis, cannabis intoxication diagnostic criteria, cannabis usage rates among the population, two items over symptoms of cannabis use, long-term side effects, and potential sources of risk factors amongst students. Each question in the knowledge section gave the student a true or false statement based on the current DMS-V guidelines over CUD. Each question was scored as 1 = correct or 0 = incorrect.

The attitudes section contained 11 items assessing the participants' attitudes towards the use of cannabis and its potential hazards in the medical and recreational settings using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, or 5 = strongly agree). This survey section contained two distinct domains: attitudes toward MC and RC use. The first domain, attitude towards medical cannabis (MC) use, had five items and aimed to determine the students' position regarding medical cannabis use legality, safety when used responsibly, potential for abuse and criminal activity, professional knowledge, and primary source of support for cannabis use. The second domain, attitude towards recreational cannabis use, had the first five items identical to the first but now focuses on recreational cannabis use rather than medical. In addition, a sixth item capturing the respondents' perceptions of the adverse effects of cannabis use.

The BI of confidence in counseling on CUD contained four items that aimed to understand BIs in real-life situations that would be expected of a pharmacist. The section seeks to determine the students' BI based on their confidence in answering questions or concerns about cannabis use, safety, abuse potential, and referral for potential therapy for CUD. Like the attitudes section, the 5-point Likert scale was used in the BI (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

Lastly, sample characteristics included a section collecting gender, age, ethnicity, academic year, and other information specific to student understanding of the legality of cannabis use and its knowledge. Students were explicitly asked to report their awareness of the MC and RC legality in the state where they are actively attending pharmacy school. Past patient interaction looks to assess if the students interacted with a patient using cannabis. Obtained knowledge asks students to report where they have gained most of their knowledge of cannabis recreationally or medically.

Data Collection Process

This structured survey was created using the Qualtrics software. Associate Deans of pharmacy schools were sent a recruitment email to consider forwarding our survey to all their students within the college. Distribution amongst students was carried out by administrative staff within each college by emailing students attending their respective colleges of pharmacy. The survey was offered to participants where it could be taken either on tablets/laptops or personal mobile phones by providing the URL or a QR code. Participation was anonymous and voluntary. The survey included a consent letter in which every student choosing to participate in the study was required to provide consent by accepting the consent letter. Sample size calculation using the QualtricsXM sample size calculator indicated a sample of 380 to be adequate. The parameters required had a confidence interval of 95%, a total population size of 47,529 representing the entire student body, and a margin of error of 5% [19]. Completed surveys were downloaded, and data was stored on password-protected computers. To promote participation, once the participants completed the study survey, they were entered into a raffle through an optional document to include their name and email to win a \$200 gift card that would be provided at the end of the recruitment period. The University Institutional Review Board approved the study.

Data Analyses

An alpha of 0.05 was used to determine statistical significance across all tests. The collected data was analyzed using descriptive and inferential statistics with SAS version 9.4M7. Continuous variables were summarized using mean and standard deviation (SD), while categorical variables used frequency and percentages of the cohort study population. Independent sample t-test, chi-square test, and one-way analysis of variance were conducted to identify any relationships between BI scores stratified by sample characteristic variables. The knowledge section score was represented by the average percent correct responses out of a total possible score of 100. The scores for attitudes towards MC use and RC use, along with the BIs, would be the average of each respective section ranging from 1 to 5. To capture the internal consistency of the modified survey, Cronbach's alpha would be calculated for the attitudes and BIs sections. Bivariate Pearson correlation analyses examined the strength and directional relationships between knowledge, attitudes toward MC use, and attitudes towards RC use and BIs. Multivariate linear regression analysis was undertaken to identify factors associated with behavior intention based on knowledge, attitudes, and sample characteristics as the independent variables in the model.

Results:

Sample Characteristics

513 potential students initiated the survey. Of these, 102 participants did not complete the survey with comprehensive responses, warranting exclusion from the analysis. With an overall response rate of 80.1%, the remaining 411 students who completed the survey were included in the final study analysis. The average age of respondents was 24.7 (SD = 4.2). Nearly three-quarters of the respondents were female (74.2%). The distribution between class ranks primarily consisted of first- and third-year students at 38.7% and 32.4%, respectively. The most prominent ethnic group was Caucasians (41.4%), followed by Asians (31.3%). Nearly three-quarters of the students (73.2%) resided in recreationally legal states, while being aware of MC and RC use in their state was 66.7% and 73.2% of the time, respectively. Nearly 4 in 10 (39.2%) students responding indicated they acquired their knowledge of cannabis through a seminar lecture outside of their pharmacy curriculum. While most students (51.3%) did have a past interaction with a patient using cannabis, there was not a significant difference in frequency (Table 1). Significant differences existed in BI scores by gender, ethnicity, academic year, awareness of MC, past patient interaction, and obtained knowledge.

Table 1. Sample characteristics and behavioral intentions on confidence to counsel over CUD (N = 411).

Variable	Characteristics	Frequency	%	Mean	SD	P-value
Gender	Male	106	26	2.99	0.99	0.0027
	Female	305	74	2.65	0.99	
Ethnicity	Caucasian	170	41	2.67	0.95	0.0377
	Black or African-American	35	9	2.95	1.14	
	Hispanic or Latino	42	10	2.40	0.98	

	Asian	128	31	2.81	1.00	
	Native Hawaiian or Pacific Islander	4	1	2.31	1.55	
	Middle Eastern	32	8	3.06	0.97	
Academic	Pharmacy Student - P1	159	39	2.78	1.05	< 0.0001
Year	Pharmacy Student - P2	70	17	2.27	0.82	
	Pharmacy Student - P3	133	32	2.85	1.00	
	Pharmacy Student - P4	49	12	2.98	0.92	
Legal	No	110	27	2.72	1.03	0.4918
status	Yes	301	73	2.79	0.94	
Awareness	No	137	33	2.55	1.07	0.0112
of MC	yes	274	67	2.83	0.95	
legality						
Awareness	No	110	27	2.60	1.06	0.1093
of RC	Yes	301	73	2.79	0.98	
legality						
Past	No	211	51	2.64	1.02	0.0413
patient	Yes	200	49	2.84	0.98	
interaction						
Obtained	Past recreational use	122	30	2.87	1.04	0.0341
knowledge	Past medical use	8	2	3.19	1.29	
	Curriculum lecture (PharmD curriculum)	120	29	2.80	0.98	

	Seminar lecture (Outside of PharmD curriculum)	161	39	2.57	0.96	
All data are in n (%) format unless stated.						
MC = medical cannabis, RC = recreational cannabis						
Behavioral intentions were scored using the 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, or 5 = strongly agree).						

Knowledge, Attitudes, and Behavior Scores towards CUD

The students' average score on the knowledge section was 81% (SD 16%), ranging from 11% to 100%. One question from this section was removed from the final analysis as further revision indicated an apparent ambiguity in this question's interpretation. The final survey analysis was scored out of nine, where a perfect score would equate to 100% in the knowledge section. The resulting attitudes towards MC use in domain one and attitudes towards RC use in domain two resulted in an average sub-score of 4.13 (SD 0.75) and 3.28 (SD 0.80), respectively, with ranges from 1 to 5. Lastly, the average score for the BIs section was 2.74 (SD 1.00), ranging from 1 to 5. The Cronbach's alpha of the modified survey measuring internal consistency for the attitudes towards MC, attitudes towards RC, and BIs sections were 0.80, 0.80, and 0.91, respectively. (Table 2)

Table 2. Pharmacy Students' Knowledge, Attitudes, and Behavioral Intentions towards CUD (N = 411).

	Mean	SD	Minimum	Maximum	Cronbach's α
Knowledge (% correct)	81	16	11	100	
Attitudes towards MC use	4.13	0.75	1.00	5.00	0.80
Attitudes towards RC use	3.28	0.80	1.00	5.00	0.80
Behavioral Intention	2.74	1.00	1.00	5.00	0.91
MC = medical cannabis, RC = recreational cannabis					
The 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, or 5 = strongly agree) scored attitudes towards both MC and RC and their behavioral intentions.					

Relationship of Knowledge, Attitudes, and BIs towards CUD

The correlation of knowledge-attitudes toward MC use ($r = 0.33$, $p < 0.0001$) and knowledge-attitudes toward RC use ($r = 0.12$, $p < 0.05$) both were positively correlated. Attitudes towards MC use-attitudes toward RC use ($r = 0.64$, $p < 0.0001$) were positively correlated along with attitudes

toward RC use-BIs ($r = 0.22$, $p < 0.0001$). Both knowledge-BIs and attitudes towards MC use-BIs trended negatively but were insignificant. (Table 3)

Table 3. Pearson Correlation Coefficient for Knowledge, Attitude and Behavioral Intension towards CUD (N = 411).

	K	AMCU	ARCU
Knowledge (K)	-		
Attitudes Towards Medical Cannabis Use (AMCU)	0.33**	-	
Attitudes Towards Recreational Cannabis Use (ARCU)	0.12*	0.64**	-
Behavioral intentions (BI)	-0.09	-0.01	0.22**
*Correlation is significant at the < 0.05 level **Correlation is significant at the < 0.0001 level			

Multivariate linear regression to predict factors associated with behavioral intension on confidence to counsel on CUD indicated attitudes towards MC use ($\beta = -0.31$, $p < 0.0007$), attitudes towards RC use ($\beta = 0.43$, $p < 0.0001$), academic year: P2 ($\beta = -0.45$, $p < 0.0012$), awareness of MC legality ($\beta = 0.31$, $p < 0.0394$), obtained knowledge: seminar lecture ($\beta = -0.24$, $p < 0.0379$), and past patient interaction ($\beta = 0.24$, $p < 0.0245$) were all significantly associated with BIs after controlling for confounders. (Table 4)

Table 4. Predictors of Behavioral intention to counsel patients over CUD (N = 411).

Variables	Coefficient (β)	P-value
Attitudes towards MC use	-0.31	0.0007
Attitudes towards RC use	0.43	<.0001
Academic year enrolled: P2	-0.45	0.0012
Awareness of MC use legality	0.31	0.0394
Source of prior knowledge seminar lecture	-0.24	0.0379
Past patient interaction	0.24	0.0245
MC = medical cannabis, RC = recreational cannabis		

Covariates listed are those that showed significance in linear regression. Covariates included in the analysis were attitudes towards MC use, RC use, knowledge, academic year enrolled, awareness of MC use legality, source of prior knowledge, ethnicity, past patient interaction, awareness of RC legality, and Cannabis legality.

Discussion:

Our study found that pharmacy students were reasonably knowledgeable regarding CUD. Their attitudes towards MC use were relatively high compared to a slight decrease in attitudes towards RC use, but overall positive. However, their BIs regarding their confidence in counseling for CUD were largely negative. The discrepancy between the attitudes of the MC use and RC use might be due to a variety of reasons, such as a lack of regulatory control and clinical oversight of individuals using cannabis recreationally, the general demographic of those using cannabis recreationally, and potentially the lack of comfort to address appropriately and counsel those using cannabis recreationally. However, the multivariate linear regression indicated pharmacy students with positive attitudes towards RC use, compared to MC use, were more likely to have the intent to counsel patients. Whether this may be due to the prominent political nature of cannabis legality or another reason is yet to be understood. While performance in knowledge scores and the overall positive attitudes towards MC use and RC use were consistent with current literature, the low BIs scores indicated a general lack of confidence to counsel patients, bringing to question a gap in academic execution. [16,23] In addition, BIs scores further varied based on most sample characteristics measured except on the awareness of RC legality and the legality of the state students attending pharmacy school. Surprisingly, the students in this sample were more likely to obtain most of their knowledge of cannabis from non-PharmD curriculum lectures or past recreational use before an accredited PharmD curriculum lecture taught by appropriately distinguished educators and professors. This becomes a cause for concern as many outside sources are not validated or scrutinized at the level of healthcare curriculum based on literature and practice, which inevitably raises the concern for spreading misinformation, further driving a gap in knowledge, attitudes, and BI. This brings to question how to standardize education and maintain acceptable levels of competence in knowledge regarding cannabis therapeutics, safe administration, and management of potential adverse effects regardless of the student's characteristics or experience with cannabis.

A similar survey study in 2018 sampling students attending a single midwestern pharmacy school assessed the pharmacy students' confidence in their knowledge of MC and their attitudes towards their curriculum's coverage of MC. The results indicated a consistent overall lack of trust across all measured domains: qualifying conditions, adverse effects, and patient care skills, with nearly 80% of students feeling their curriculum coverage over the topic was inadequate [23]. Another article from 2014 looked to study the knowledge and attitudes of pharmacy students toward MC use and indicated that 59% felt MC should be legalized nationally. However, most were uncomfortable answering patients' questions regarding efficacy, safety, or drug interactions [16]. Another survey done in 2019 assessing the knowledge and attitudes of students across six Ohio pharmacy schools had an average score ranging from 50-60% on the knowledge section [17]. These findings emphasize the need for a more structured and standardized approach to educating pharmacy students about cannabis, as relying on external sources and potentially unreliable personal experiences may not ensure the depth and accuracy of knowledge required in their professional roles. Our findings also are consistent with professional students of other disciplines. Jankie et al. surveyed healthcare professionals from a university's professional medical, nursing, dental, optometry, and veterinary schools over their knowledge and attitudes toward MC. Similarly, their results showed a general lack

of overall understanding of cannabis, specifically their ability to answer patient questions (14.2%). This comes after nearly 87.3% of students said they'd be able to identify users and adverse effects. Most of their students obtained their knowledge of cannabis mainly from the internet or other non-curriculum-based sources. Likewise, their conclusion was a call to action to modify and change their students' curriculum or training methods to facilitate education and confidence in the cannabis therapeutic area [24]. This research shows that students, not limited to pharmacy students, need a curriculum overhaul focusing on identifying CUD, adverse side effects, and confidence in their ability to share information to reach the therapeutic or recreational goals of patients using cannabis medically or recreationally.

Among healthcare professionals, a systematic review in 2021 by Weisman et al. reported that medical professionals favor MC legalization (52%) while also calling for more education on MC's potential for dependence and addiction. The desire for additional education over MC use was indicated to be consistent over time based on the reviews query search ranging from 2012-2019. Considering how acceptance has grown and their desire for more training, the medical community should prioritize training current and future healthcare professionals. The proper training would give MC the appropriate platform and chance to improve economic, clinical, and humanistic outcomes [25]. Our findings largely reflect the results of other studies targeting healthcare professionals and students, with knowledge or perceived knowledge and attitudes being high while behaviors being much lower.

As for potential limitations, only a few pharmacy colleges responded while the survey was sent out to schools nationwide. In addition, of those who responded, the schools that responded were heavily biased toward Texas-based pharmacy schools. While this study takes a significant step in covering students' perceptions at a large scale, to achieve generalizability with minimal bias, students from all geographical, societal, and political backgrounds must be accounted for. A skewness in the distribution of the geographical location of responses will sway the outcomes in favor of the population in those respective locations. All the while, this study does display various strengths. This study captured a relatively large sample of students from different backgrounds, societally and politically. This allows us to capture the students' perceptions of cannabis medically and recreationally based on their respective residing state legislature and potential cultural differences based on geographical location. In addition, the results of this study can help determine the current ability of pharmacy curriculums in training students to tackle cannabis-related counseling scenarios in the field. In addition, the results also bring to light a call to action to revamp or modify current curriculums to include more of an emphasis on cannabis-related topics and patient counseling initiatives to help build the student's confidence in conveying the clinical information necessary to meet the patient's demands.

Since the legalization of medical cannabis use in California (1996), 41 states have followed with the legalization, along with four states allowing CBD oil containing THC, while only five states now remain that have completely criminalized the use of cannabis medically or recreationally [20,21]. Perceptions of cannabis use amongst cannabis users and abstainers have widely varied but remained optimistic regarding its potential benefit and its management of possible harmful adverse effects. However, due to public information lacking in quantity and quality, the results and adverse effects of cannabis can easily be interpreted and misrepresented, calling for more attention to be placed on providing educational information for the public [22].

Conclusion:

The BI of pharmacy students to counsel patients over CUD was low. Although there was a significant positive association of BI with attitude toward recreational cannabis use, the attitude towards MC use significantly lowered the willingness to counsel. Further, current knowledge was not associated with the BI to counsel CUD patients. This lack of confidence points to more and better academic experiences for students to be able to be proficient future pharmacists.

The potential need for a comprehensive adaptation of pharmacy curriculums to include a well-structured and evidence-based education on cannabis-related topics may be needed. In addition,

methods could be included to counsel patients using pharmacological agents with medical and recreational intentions. This would ensure that future pharmacists are adequately prepared to handle the evolving healthcare landscape and address the growing patient demand for information and guidance regarding cannabis use and associated CUD. By bridging the current gaps in education, pharmacy schools can play a pivotal role in producing healthcare professionals who are knowledgeable, confident, and capable of navigating the complexities of cannabis-related interventions and the needs of patients.

List of abbreviations:

THC: tetrahydrocannabinol, CBD: cannabidiol, CUD: cannabis use disorder, RC: recreational cannabis, BI: behavioral intention, and MC: medical cannabis.

Authors' Contributions: Sourab Ganna, Jerusha Daggolu, Sujit Sansgiry contributed to the study conception and design. Literature search, data curation, validation, and analysis were performed by Sourab Ganna. Sujit Sansgiry supervised the study and manuscript writing. The first draft of the manuscript was written by Sourab Ganna. All authors reviewed, revised, and approved the final manuscript.

Institutional Review Board Statement: This study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of the University of Houston (Protocol code: STUDY00003910, Date of approval: 11/4/2022).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data cannot be shared due to privacy concerns for the subjects that participated in the study.

Statement Of Acknowledgments: The authors would like to acknowledge the participating colleges of pharmacies and students for their support.

Conflicts Of Interest: The authors declare no conflict of interest.

References

1. Eichhorn Bilodeau S, Wu BS, Rufyikiri AS, MacPherson S, Lefsrud M. An Update on Plant Photobiology and Implications for Cannabis Production. *Front Plant Sci.* 2019;10:296. doi:10.3389/fpls.2019.00296
2. Rice J, Hildebrand A, Spain R, et al. A cross-sectional survey of cannabis use by people with MS in Oregon and Southwest Washington. *Mult Scler Relat Disord.* 2021;55:103172. doi:10.1016/j.msard.2021.103172
3. Pantoja-Ruiz C, Restrepo-Jimenez P, Castañeda-Cardona C, Ferreirós A, Rosselli D. Cannabis and pain: a scoping review. *Braz J Anesthesiol Elsevier.* 2022;72(1):142-151. doi:10.1016/j.bjane.2021.06.018
4. HaGani N, Sznitman S, Dor M, et al. Attitudes Toward the Use of Medical Cannabis and the Perceived Efficacy, Side-effects and Risks: A Survey of Patients, Nurses and Physicians. *J Psychoactive Drugs.* 2022;54(5):393-402. doi:10.1080/02791072.2021.2009598
5. Friedman D, French JA, Maccarrone M. Safety, efficacy, and mechanisms of action of cannabinoids in neurological disorders. *Lancet Neurol.* 2019;18(5):504-512. doi:10.1016/S1474-4422(19)30032-8
6. Turner AR, Agrawal S. Marijuana. In: *StatPearls*. StatPearls Publishing; 2023. Accessed September 4, 2023. <http://www.ncbi.nlm.nih.gov/books/NBK430801/>
7. World Health Organization. *The Health and Social Effects of Nonmedical Cannabis Use*. World Health Organization; 2016. Accessed September 4, 2023. <https://apps.who.int/iris/handle/10665/251056>
8. Lipari RN. Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health. Published online 2019.

9. Hasin DS, Saha TD, Kerridge BT, et al. Prevalence of Marijuana Use Disorders in the United States Between 2001-2002 and 2012-2013. *JAMA Psychiatry*. 2015;72(12):1235-1242. doi:10.1001/jamapsychiatry.2015.1858
10. Lopez-Quintero C, Pérez de los Cobos J, Hasin DS, et al. Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Depend*. 2011;115(1-2):120-130. doi:10.1016/j.drugalcdep.2010.11.004
11. Patel J, Marwaha R. Cannabis Use Disorder. In: *StatPearls*. StatPearls Publishing; 2023. Accessed September 4, 2023. <http://www.ncbi.nlm.nih.gov/books/NBK538131/>
12. Di Forti M, Marconi A, Carra E, et al. Proportion of patients in south London with first-episode psychosis attributable to use of high potency cannabis: a case-control study. *Lancet Psychiatry*. 2015;2(3):233-238. doi:10.1016/S2215-0366(14)00117-5
13. Di Forti M, Morgan C, Dazzan P, et al. High-potency cannabis and the risk of psychosis. *Br J Psychiatry J Ment Sci*. 2009;195(6):488-491. doi:10.1192/bjp.bp.109.064220
14. Gabri AC, Galanti MR, Orsini N, Magnusson C. Changes in cannabis policy and prevalence of recreational cannabis use among adolescents and young adults in Europe-An interrupted time-series analysis. *PloS One*. 2022;17(1):e0261885. doi:10.1371/journal.pone.0261885
15. Ryan JE, McCabe SE, Boyd CJ. Medicinal Cannabis: Policy, Patients, and Providers. *Policy Polit Nurs Pract*. 2021;22(2):126-133. doi:10.1177/1527154421989609
16. Moeller KE, Woods B. Pharmacy Students' Knowledge and Attitudes Regarding Medical Marijuana. *Am J Pharm Educ*. 2015;79(6):85. doi:10.5688/ajpe79685
17. Berlekamp D, Rao PSS, Patton T, Berner J. Surveys of pharmacy students and educators regarding medical marijuana. *Curr Pharm Teach Learn*. 2019;11(7):669-677. doi:10.1016/j.cptl.2019.03.006
18. Shulman H, Sewpersaud V, Thirlwell C. Evolving Global Perspectives of Pharmacists: Dispensing Medical Cannabis. *Cannabis Cannabinoid Res*. 2022;7(2):126-134. doi:10.1089/can.2020.0144
19. Fall 2021 Enrollments - Profile of Pharmacy Students. Accessed September 3, 2023. <https://www.aacp.org/node/2706>
20. Bridgeman MB, Abazia DT. Medicinal Cannabis: History, Pharmacology, And Implications for the Acute Care Setting. *P T Peer-Rev J Formul Manag*. 2017;42(3):180-188.
21. State Medical Cannabis Laws. <https://www.ncsl.org/health/state-medical-cannabis-laws>. Published June 22, 2023. Accessed September 4, 2023.
22. Kvillemo P, Strandberg AK, Gripenberg J. Attitudes to Cannabis Use and Public Prevention Information Among Young Adults: A Qualitative Interview Study With Implications for Prevention Practice. *Front Public Health*. 2022;10:830201. doi:10.3389/fpubh.2022.830201
23. Caligiuri FJ, Ulrich EE, Welter KJ. Pharmacy Student Knowledge, Confidence and Attitudes Toward Medical Cannabis and Curricular Coverage. *Am J Pharm Educ*. 2018;82(5):6296. doi:10.5688/ajpe6296
24. Jankie S, Sewdass K, Smith W, et al. A cross-sectional survey of prospective healthcare professionals' knowledge, attitudes and perceptions of medical Cannabis. *Explor Res Clin Soc Pharm*. 2023;10:100275. doi:10.1016/j.rcsop.2023.100275
25. Weisman JM, Rodríguez M. A systematic review of medical students' and professionals' attitudes and knowledge regarding medical cannabis. *J Cannabis Res*. 2021;3(1):47. doi:10.1186/s42238-021-00100-1

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.