



The impact of education on attitudes toward medical cannabis

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ABSTRACT

Objective: This research explores the impact of patient education on reducing historical and current stigma.

Methods: Participants were recruited through social media, parenting with community organizations, and snowball sampling. A pretest posttest method was utilized. Participants viewed five balanced educational videos about medicinal cannabis. Attitudes toward medical cannabis were measured with a modified version of the medical component of the Recreational and Medical Cannabis Attitudes Scale (RMCAS). In total, 111 participants completed all requirements of the study.

Results: Results of a Wilcoxon Sign Rank Test demonstrated a significant increase in the modified medical component of the RMCAS (1.18, $p = 0.029$).

Conclusion: Health education is an effective intervention to reduce stigma associated with medical cannabis. Future health policies must take a balanced, education-focused, and proactive stance in reducing barriers to care that exist due to the negative stigma associated with cannabis use.

Innovation: Historically, patient education has focused on areas such as tobacco, automobile safety, vaccinations, obesity, and the like. This research applied patient education to the area of medical cannabis to improve attitudes toward it and improve patient access.

1. Introduction

Public opinion toward cannabis, particularly for medicinal uses, has shifted in a more positive direction since the 1990's [1]. The perception of cannabis from the public is informed by a number of factors, and each individual may have a different view based on personal needs or experience. Factors informing opinions of cannabis use may include generational cohort, religious affiliation, media exposure, prior or current prescription and illicit drug use, and political affiliation. However, even as attitudes toward cannabis have improved, there remains a significant stigma attached to cannabis that needs to be addressed [2,3].

Even though medicinal cannabis was legalized in California over 20 years ago, patients have faced difficulties receiving treatment. Patients across the United States have reported that the stigmatization of cannabis is a significant barrier to accessing it for treatment [2,3]. In a study conducted in Florida, where cannabis is legal for medicinal use, only 9% of medical cannabis consumers reported their primary physician recommended it as a treatment option [3]. In another study, patients noted the belief that their employers, family members, and healthcare providers possessed a negative stigma toward medical cannabis; patients noted they were worried about being thought of as a "pothead" or "stoner". Due to the stigma surrounding medical cannabis, particularly by their own

healthcare providers, patients tend to seek out medical cannabis from those with whom they do not have a long-term relationship [7].

The lingering stigma toward cannabis may be due, in part, to the remaining associations from the War on Drugs focus of U.S. health policy. Public school students across the United States in the sixth grade were exposed to Drug Abuse Resistance Education (D.A.R.E.) lessons. In these lessons, specially trained police officers presented students with general knowledge about illicit drugs. Until 2016, D.A.R.E. lessons taught that cannabis is a "gateway drug," or a substance that leads to the misuse of more abuse-prone substances [4]. While the D.A.R.E. program has been found to be largely ineffective in reducing illicit drug use among its participants, individuals who completed the lessons retained implicit beliefs on the negative effects of cannabis [5,6].

Examining past efforts of de-stigmatization can provide an important pathway to understanding how cannabis can have its stigma removed in the future. A well-documented example of a public health issue that has moved past its stigma is the HIV/AIDS epidemic. The beginning of the HIV epidemic in the 1980s proved to be riddled with misinformation. HIV/AIDS was heavily associated with marginalized groups such as sex workers, gay men, and drug users [8]. However, as medical knowledge advanced in a meaningful way, many of the misconceptions of the HIV/AIDS epidemic began to diminish. The notion that only gay men could get AIDS

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was eventually dispelled when Magic Johnson publicly announced his HIV status [9]. Medical evidence, paired with Magic Johnson's openness, proved to be a powerful public health education campaign toward removing the dangerous stigma that was associated with HIV/AIDS.

To better understand perceptions associated with medical cannabis use, this study sought to analyze the effectiveness of formal education in changing attitudes toward medicinal cannabis. While there are many factors influencing public perceptions, formal education efforts in the past with the HIV/AIDS epidemic proved to be vital toward removing stigma. Formulating an education plan informing the public, patients, and health care practitioners may be a driving force for the normalization of medical cannabis use for patients seeking treatment.

2. Methods

2.1. Design

A pretest-posttest design was used. Participants completed an initial survey regarding attitudes toward medical cannabis, viewed five prerecorded educational lectures on medical cannabis, and then completed the post-survey to measure any changes in medical cannabis attitudes.

2.2. Educational lecture development

Five educational lectures were prepared by the first two authors who have educational and professional experience in medical cannabis. The presentations were given via PowerPoint, recorded, and uploaded to YouTube for participants to access via the research website. The presentations ranged in length from 7:36 to 19:41, which required a total participant time commitment of approximately 1.5 h.

The respective lectures focused on the historical uses of medicinal cannabis; pain; anxiety, mood disorders, and insomnia; cancer; as well as risks and negative effects. Topics for the educational lectures were based on an extensive literature review, which concluded that the most common ailments currently being treated by medicinal cannabis are sleep disorders, pain, and anxiety disorders [10,11]. There also exists a substantial amount of cross-disciplinary research that suggests the quality of life of a cancer patient, whether receiving treatment or not, can be improved with the use of medicinal cannabis [12,13].

All content was educational in nature with a balanced approach, including positive and negative aspects of medical cannabis. Each video clearly stated that no recommendation for medicinal cannabis was being made and anybody considering its use should seek the advice of a medical professional for any diagnosing, dosage, or administration specifics.

2.3. Scale selection

To accurately gauge the attitudes of participants in this study, the Recreational and Medical Cannabis Attitudes Scales (RMCAS) published by Arora et al. [14] was utilized. This scale accurately determines the attitudes of participants regarding recreational cannabis and medicinal cannabis, separately. Both components that comprise the scale are reported to be reliable, with the Medical Cannabis Attitudes Scale (MCAS) reporting a reliability coefficient of 0.86, and the Recreational Cannabis Attitudes Scale reporting a reliability coefficient of 0.91. Each component of the scale was designed to measure different aspects that may inform attitudes: questions were targeted at measuring social beliefs, current legal restraints, past beliefs, and perceived future risk.

For this current study, only the MCAS was implemented, but modified to remove the one question that measured older participants' past views on medical cannabis when they were younger: "When I was 18, I believed that using marijuana for a medical purpose was acceptable." This question was omitted from the analysis because the researchers designed the survey to not display this question to anyone under the age of 35 out of concern it would be perceived as confusing given younger participants' relative closeness in age to 18. Omitting this question from the analysis left five questions

remaining for all participants so that a standard MCAS score could be used regardless of age. Using a five-point Likert scale, with appropriate questions reverse-coded so that a higher score reflected positive attitudes, a total score range of five to 25 was possible.

Additionally, two patient scenarios were devised to measure real-world beliefs of medicinal cannabis use with a practical application. In the first of the two, an individual was presented as having military related Post Traumatic Stress Disorder (PTSD). The patient had not sought the advice of a medical professional and had not tried prescription medication but had success with medical cannabis after the recommendation from a friend. The second scenario detailed an individual who was suffering from chronic pain due to a car accident. The patient had tried opioid therapy and was unable to tolerate the side effects, relief from the patient's chronic pain was found after trying medical cannabis. The scenarios stayed consistent throughout both surveys. After reading the scenarios, participants were asked to indicate their level of agreement that the patient should have access to medical cannabis for their respective ailments using a five-point Likert scale.

2.4. Participant recruitment

Methods to distribute the survey and garner participation included on-line solicitation, publication through the social media platforms of a southern California state university, partnerships with community learning organizations, and snowball sampling. Social media platforms utilized included Facebook and Instagram. To motivate participation, respondents were entered to win one of five \$100 Amazon gift certificates. The survey was published in February of 2021, and it remained open until July of 2021. Responses were recorded using Qualtrics software. Upon closure, data was scrubbed to remove any participants who did not complete the survey in its entirety.

2.5. Participants

Adults aged 18 and older with an internet connection and ability to view YouTube videos were eligible to participate. The only exclusion criterion was not self-reporting having viewed at least four (80%) of the educational lectures.

2.6. Data analysis

Data was analyzed using SPSS version 27.0. To accurately analyze the change in medicinal cannabis attitudes, a Wilcoxon Sign-Rank Test (WSR) was utilized. Because the samples are related, the Mann-Whitney *U* test could not be used. Additionally, the sample was determined to be skewed positively after inspecting Q-Q plots and scatter plots, eliminating the possibility of using a Paired Samples *T*-Test. The WSR does not assume the sample is normally distributed, allowing for the skewed distribution that was observed. All assumptions of the WSR were met. Significance level was set at $p < 0.05$.

2.7. Ethical review

The research protocols were reviewed by the Institutional Review Board at California State University Channel Islands (#IO5559). Participants electronically acknowledged the informed consent before participating in the study. Due to the sensitive nature of the questions asked in this study, survey respondents were assured raw data would remain confidential and would not be shared.

3. Theory

The social and medical landscapes on which patients make medical decisions shifts over time. Currently, patients in the United States needing medical cannabis face barriers to care because of negative perceptions the public has towards the plant. Historical analysis of public health policies,

such as the D.A.R.E. campaign and response to the HIV/AIDS epidemic, in conjunction with consideration of current perceptions of medical cannabis is necessary to conceptualize the steps to eliminating barriers to care. Additionally, successful interventions in reducing current stigma must be determined. This research sought to analyze the effectiveness of balanced education on medical cannabis stigma reduction.

4. Results

4.1. Participant characteristics

At closure of the survey, 272 individuals had enrolled in the study. However, 151 initial respondents did not move on to the final survey. Data from the remaining 121 participants was screened to determine which participants completed all tasks. Nine respondents were removed for the failure to watch at least 4 of the educational lectures and 1 participant was removed for failure to complete the follow-up survey in its entirety. This resulted in 111 participants for data analysis.

Participant demographics are detailed in Table 1. Generally, most participants fell between the ages of 25 and 54 and identified as female, White, non-Hispanic, Christian, moderate politically, and educated. Participants who indicated they had used cannabis for any reason accounted for 70.2% of responses ($n = 78$) leaving 29.7% of participants who had never used cannabis ($n = 33$). Participants who indicated that they had used cannabis in the last month accounted for 29.7% of respondents ($n = 50$) and 25.2% indicated that they had not ($n = 28$). Participants who were currently using cannabis at least once a month accounted for 28.8% ($n = 32$); 18.9% of participants reported having used it ever for medical reasons

Table 1
Participant demographics.

	N	Percentage
Gender		
Male	25	22.5
Female	85	76.6
Non-binary	1	0.9
Age		
18–24	24	21.6
25–54	54	48.6
55–84	33	29.7
Hispanic Origin		
Yes	24	21.6
No	87	78.3
Identity		
White	87	20.20
Non-white	24	20.08
Political Affiliation		
Democrat	52	46.8
Republican	23	20.7
Independent	27	24.3
Political View		
Very liberal	19	17.1
Slightly liberal	27	24.3
Moderate	44	36.9
Slightly to very conservative	21	18.9
Education Level		
High school/trade school	40	36.0
Bachelor's degree or higher	71	64.0
Religion		
Catholic/Christian	62	19.35
Jewish	4	3.6
No Religion	34	30.6
Buddhist	1	0.9
Other	10	9.0
Employment Status		
Full-time	40	36.0
Part-time	17	15.3
Unemployed	18	16.2
Retired	20	18.0
Student	10	9.0
Disabled	6	5.4

($n = 21$) and 17.1% of participants reported currently using cannabis for medicinal purposes ($n = 19$). Out of those participants who had used cannabis for medicinal purposes ($n = 40$), 35.0% of them based their use on the recommendation of a physician or licensed healthcare provider ($n = 14$) and 65.0% participants had used cannabis without a professional recommendation ($n = 26$; Table 2).

The participants drew from a total of 21 states, the largest of which were California (64.8%), Missouri (6.3%), Washington (3.6%), and Texas (2.7%). The participants' states of residence were categorized by cannabis legal status: not legal (10.8%), medical only (14.4%), and medical and recreational legal (74.8%).

To confirm the omission of the question regarding views at age 18 did not impact the results, a comparison of the MCAS score and modified MCAS score for those age 35 and older was made. Including the question, the mean MCAS score was 22.93 out of 30 (76.4%) compared to 19.85 out of 25 (79.4%) without. Given that the intent of this research project was to see if education improved attitudes toward medical cannabis, starting with a higher relative score would have only made finding statistically significant results more difficult. Thus, it was concluded that this omission was not harmful to the outcome of the study.

4.2. Medical cannabis attitudes

Inferential statistics suggest that formal education does, in fact, reduce the negative stigma associated with cannabis consumption. Results from a WSR indicate that there is a significant increase in modified MCAS scores after viewing the educational lectures.

There was a significant increase of 1.18 in the modified MCAS score after participants viewed the educational lectures (Table 3; $p < 0.029$). There was also an increase in the modified MCAS score in specific demographic groups, such as participants who identified as female, which increased by 1.34 ($p < 0.010$), 25-54-year-olds increased by 1.57 ($p < 0.025$), those who did not identify as Hispanic increased by 1.33 ($p < 0.050$), and those who identified as White increased by 1.26 ($p < 0.011$). An increase of 1.52 was also observed in those who received a bachelor's degree or higher ($p < 0.003$) and an increase of 1.44 in participants who identified with the religion Catholic/Christian ($p < 0.025$). The largest increase in modified MCAS score was observed in participants who identified as slightly and very conservative, which increased by 4.61 ($p < 0.002$), and participants who never used cannabis for any reason, which increased by 3.52 ($p < 0.000$).

There was no significant change in the modified MCAS score in participants who identified as male, 18–24, 55–84 years old, and earned less than a bachelor's degree. No significant change was observed in those of Hispanic origin and non-white. Participants who had a Democratic, Republican, or Independent political affiliation, and those who had a very liberal, slightly liberal, or moderate political views also had no significant change in the modified MCAS score. Additionally, no significant change was noted in participants who indicated no religion, and those who have used cannabis for any reason prior (Table 3; $p > 0.05$).

Although there was no significant change in the modified MCAS score in all three political affiliation groups, those self-identifying as Republican

Table 2
Participant cannabis exposure.

	N	Percentage
Ever use cannabis		
Yes	78	70.2
No	33	29.7
Used cannabis for medical reasons		
Yes	40	36.0
No	71	64.0
Medical cannabis use based on physician recommendation		
Yes	14	35.0
No	26	65.0

Table 3
Modified MCAS score before and after educational lecture series.

	N	Pre Survey	Post Survey	Z Value	P Value
Overall	111	20.17	21.35	-2.188	0.029
Gender					
Male	25	20.72	21.40	-0.302	0.763
Female	85	20.00	21.34	-2.566	0.010
Age					
18–24	24	20.67	20.50	-0.233	0.824
25–54	54	19.76	21.33	-2.246	0.025
55–84	33	20.48	22.00	1.052	0.296
Hispanic Origin					
Yes	24	19.83	20.50	-0.995	0.320
No	87	20.26	21.59	-1.960	0.050
Identity					
White	87	20.20	21.46	-2.544	0.011
Non-white	24	20.08	20.96	-0.119	0.905
Highest Degree					
Less than Bachelor's	40	20.80	21.38	-0.642	0.521
Bachelor's degree or higher	71	19.82	21.34	-3.021	0.003
Political Party					
Democrat	52	21.44	22.06	-0.7560	0.449
Republican	23	17.48	20.17	-1.713	0.087
Independent	27	20.15	21.00	-1.121	0.262
Political View					
Very liberal	19	23.05	22.95	-0.412	0.681
Slightly liberal	27	20.96	21.33	-0.204	0.838
Moderate	44	20.30	20.89	-0.929	0.353
Slightly to very conservative	21	16.29	20.90	-3.058	0.002
Religion					
Catholic/Christian	62	19.35	20.79	-2.236	0.025
No Religion	34	21.15	21.85	-0.368	0.713
Ever Use Cannabis					
Yes	78	21.40	21.59	-0.165	0.869
No	38	17.27	20.79	-3.626	0.000

showed the most increase in positive attitudes toward medical cannabis with an increase of 2.69 (Table 3; $p > 0.087$). A 0.62 increase in modified MCAS score was seen in those self-identifying as Democrat and a 0.85 increase in those self-identifying as Independent.

4.3. Patient scenarios

Most participants were supportive of the patients in both scenarios having access to medical cannabis: 79.3% and 75.7% of participants selected “strongly agree” that the patients should have access for the PTSD and chronic pain patients, respectively, at baseline. After viewing the educational lectures, the proportion of participants selecting “strongly agree” increased to 85.6% and 82.9%, respectively. The change in support for access to medical cannabis increased significantly for both patient scenarios as a whole (PTSD and chronic pain) after participants viewed the educational lectures ($p < 0.007$). The change was also significant for the individual scenarios: PTSD ($p < 0.042$) and chronic pain scenario ($p < 0.024$).

5. Discussion and conclusion

5.1. Discussion

The results of this study support the use of formal education as a means of changing attitudes toward medical cannabis. Education, thus, will likely help reduce stigma that many medical cannabis patients have experienced [12,15]. Utilizing public health resources and existing relevant medical cannabis health policy, an established plan to educate the public more effectively can be developed, therefore reducing future stigma, and increasing patients' access to care.

The health policy in the United States has shifted from the War on Drugs perspective toward a more medical one over the last three decades, as it relates to cannabis. California was the first state to see medical cannabis

legalized in 1996, and as of August 2021, thirty-five states have followed the path set by California in legalizing cannabis medically. This relatively rapid increase in acceptance of medical cannabis can be connected to the impact that the media has had in influencing the public [16]. Attitudes toward cannabis in both television and print media had a significant, positive relationship toward the legalization of cannabis from the period of 1991–2012 [17]. In 2014, over a one-month period, Twitter produced over 15 times as many pro-cannabis tweets as anti-cannabis ones [18]. This trend of pro-cannabis information outweighing the anti-cannabis information online should contribute to a shift of cannabis attitudes in a more positive direction. Even so, there remains a gap between cannabis attitudes in the media and realized patient stigmas [19]. As a result, public cannabis education efforts which emphasize the current scientific understanding and evidence for medical cannabis use are vital to meeting patient needs. Health policy needs to begin incremental policy changes toward an actively supportive role in allowing and providing patient access.

Participants indicated strong support for patient access to medical cannabis in the scenario questions before viewing the educational lectures; and the support increased after viewing them. This support, though, was observed even when participants did not indicate a pro-medical cannabis stance in the absence of a personal patient scenario; participants seemed to be objectively opposed to medical cannabis, but then supported it when provided with a personalized clinical need for it. This is not dissimilar to research on individuals changing their attitudes toward LGBTQ rights and public policy when a friend or family member comes out as gay [20,21].

Currently, there is a knowledge gap among health care providers as there is no standardized curriculum for medical cannabis across nursing or medical schools in the United States [22]. Consequently, patient demand for medical cannabis vastly outweighs the number of qualified practitioners who have been properly educated about it [23]. Research has shown that two-thirds of medical school curriculum deans believed that their graduates were “not at all” prepared to recommend medical cannabis to patients [22]. This is especially troubling given the patient need of and clinical evidence for cannabis as a viable alternative to opioid use [7,24,25]. The disconnect between medical cannabis patients and their providers' understanding of medical cannabis contributes to significant treatment issues. A recent study in Michigan found that only 21% of medical cannabis patients were comfortable with their primary care physician's ability to incorporate medical cannabis as a treatment option [26]. As medical cannabis legality continues to expand throughout the United States, it is essential that further research and education efforts go beyond public education and target healthcare professionals to ensure that they can be knowledgeable and comfortable recommending medical cannabis to patients and further reduce stigmas associated with this treatment option [2].

The strengths of this study included presenting balanced information with both the benefits and risks of cannabis and focusing on the most relevant clinical applications. There were, though, some weaknesses. The study results may not be generalizable to the national population because of its lack of variety of participants from more politically conservative areas. A large portion of the sample size comprised individuals from the state of California, where the use of medical cannabis has been legalized since 1996. Though this sample overrepresents California, with full access to medical and recreational cannabis, given the relative populations of the states with full access to cannabis versus the states with no access, the sample does not vary from the country's population [26]. Further, recent research demonstrated that states' legal status of cannabis is not a predictor of resident's attitudes on cannabis [27].

The sample contained a larger percentage than the national averages of participants who identified as White or female. There was also a high dropout rate; this likely was due to the requirement of watching nearly 1.5 h of educational sessions, a large commitment with only the potential for a small monetary reward.

Additionally, researchers were unable to verify if participants viewed the educational lectures. With there being no researcher monitoring the participants, any number of external factors could have prevented the

participants from finishing, and those that did claim to finish the videos could have falsified their level of completion. However, a review of the videos on the primary author's YouTube account showed that each video had been viewed more than 125 times. This is more than the total number of participants in the study. Though this does not confirm specific participant's viewing of the education lectures, it supports engagement from the participants as the videos were only available on the main research website and set to be viewed only to those who had the link (i.e., not publicly available on YouTube). Likewise, the level of participant engagement with the lectures was not verified.

5.2. Innovation

The innovative aspects of this study include the application of health education to medical cannabis. Patient education and public health efforts have historically been aimed toward tobacco use, obesity, sex education, vaccinations, road safety, and, more recently, social distancing and mask-wearing in the wake of the COVID-19 pandemic [28,29]. Despite the growing support and evidence of cannabis as a safe and effective treatment for a range of medical issues, cannabis has not been widely supported in health education and public health campaigns as an alternative treatment [22–24]. This current research applied the concepts used toward these historically favored public health topics in patient education to medical cannabis to change attitudes regarding it.

5.3. Conclusions

Medical cannabis can offer a safe and effective treatment to patients, but lingering stigma presents a barrier for them [2,3,7]. Given the increasing medical applications of cannabis, the need to reduce the stigma remains an important goal. This study provides evidence to support the use of education to change attitudes toward medical cannabis. Similar research has shown the role education can play in changing attitudes toward public health issues [28,29]. However, due in part to the stigma, cannabis has never been featured in public health campaigns despite the growing opioid epidemic and the potential for cannabis to aid in reducing it [7,24,25]. Education plays a crucial role in reducing stigmas associated with cannabis consumption. Throughout the country, evolving health policies are providing more access to medical cannabis for more patients, but many others are not seeking this potential treatment option because of fears of the known stigmas. Increasing education efforts as part of these health policies will improve patient access even further.

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Declaration of Competing Interest

The authors report no declarations of interest.

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