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## Healthcare Workers' and Students' Current Knowledge and Perceptions of Medical Marijuana Laws


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**HEALTHCARE WORKERS' AND STUDENTS' CURRENT KNOWLEDGE AND  
PERCEPTIONS OF MEDICAL MARIJUANA LAWS**

A Master's Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Health Promotion and Wellness Management

By

Cole Stomp

May 2021

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# **HEALTHCARE WORKERS' AND STUDENTS' CURRENT KNOWLEDGE AND PERCEPTIONS OF MEDICAL MARIJUANA LAWS**

Public Health and Sports Medicine

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Master of Science

Cole Stomp

## **ABSTRACT**

As states across the United States enact Medical Marijuana Laws (MMLs), it is important to understand the implications of these policies and what effect they may have on the current healthcare industry. There is a lack of medical marijuana (MM) access due to novel policy and discrepancy of state legislature between those legalizing MM use versus current federal law. As of November, 2018, the state of Missouri has adopted MM policy, yet the perceptions, attitudes, and knowledge of MM and MMLs for current and future healthcare workers remains unknown. Therefore, the purpose of this study was to survey local healthcare workers and healthcare students of their current knowledge and perceptions of MM and MMLs. Fifty-four healthcare workers or students completed the survey. Psychometric analysis was used to assess the reliability and validity of the attitudes and perceptions survey via factor analysis and a Cronbach's Alpha (CA) score. Four subscales were created including: Safety 8-item subscale (CA=.89), Advocacy 7-item subscale (CA=.79), Awareness 8-item subscale (CA=.70), and Misuse 8-item subscale (CA=.88). There were statistically significant differences among healthcare workers and students regarding perception of MM safety ( $p = .014$ ), and perceptions that MM has been adequately studied by scientists ( $p = .047$ ). Perceptions of MMLs may be changing due to an increasing number of states in the U.S with mixed policies. Public health education on MM should include safe alternatives due to the development of CBD-based therapies. This will add to current research of MM and be utilized to help clarify how policy impacts the healthcare industry within the state of Missouri. Future studies should also present validity data for measures of knowledge and perceptions of MMLs among healthcare workers and students, which could help explain the impact of MMLs on perceptions among patients and providers. However, responses show inconsistent knowledge of MMLs and a small percent have received education on MM. This population within Missouri is in direct contact with patients and should be properly educated on the subject of MMLs. Missouri's healthcare industry should stay informed on treatments that are available to its people and provide all the necessary information about such treatment.

**KEYWORDS:** medical marijuana, medical marijuana laws, qualifying conditions, alternative treatment, healthcare workers

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In the interest of academic freedom and the principle of free speech, approval of this thesis indicates the format is acceptable and meets the academic criteria for the discipline as determined by the faculty that constitute the thesis committee. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

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I dedicate this thesis to Amanda & Savanna

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## INTRODUCTION

“Marijuana” is a term used to reference the flowering plant known as *Cannabis Sativa* (*Health Effects*, 2017, p. 38). When used for medical purposes it’s referred to as, “Medical Marijuana” (MM) which is utilized as an unconventional treatment for multiple conditions (National Conference of State Legislatures [NCSL], 2020). This controversial alternative medicine treatment has recently gained attention in the United States.

Marijuana legalization is contingent on the basis of medicinal use in some states in the U.S., and as of November 2020, 36 U.S. states have enacted Medical Marijuana Laws (MMLs) (NCSL, 2020). Medical Marijuana Laws decriminalize marijuana on the basis of medicinal use. While Medical Marijuana Programs (MMPs) allow use for people with qualifying medical conditions, fifteen states restrict access only to allow use of "low THC, high cannabidiol (CBD)" products (Johns, 2015). Recently, federal status of marijuana was once again reconfirmed in federal hearings (Bessette, 2016). Due to the lack of federal agreement on drug classification and appropriate use of MM, research on the topic is limited (Tilburg et al., 2019). Because federal guidelines outlaw marijuana, this remains a hindrance to its possible uses and further research.

One area of interest is as an “alternative pain treatment to opioids” (Tilburg et al., 2019). Due to the federal status of marijuana, research has been limited. However, more recently restrictions were loosened for medical research (Bessette, 2016). There are multiple uses for MM, including to reduce pain and improve overall quality of life for individuals with chronic or life-threatening illnesses. This implication of MM as a treatment option for individuals with chronic conditions has led to discussion of considering reassessment of scheduling marijuana as an illicit drug (Tilburg et al., 2019). Research has demonstrated both self-reported benefits and negative side effects in efforts to understand patient perspectives of MM usage as an alternative

pain treatment (Bigand et al., 2019). Understanding the perceived effects are important to developing strategies for possible usage of MM.

With lack of federal guidance for creating and implementing MM policy, policy design is left to the individual state to pass MMLs. Due to this autonomy, there is state-to-state variance of MMLs. Current MMLs among states cover varying definitions of patient access, possession, qualifying conditions, and prior policy as models to implement (Kim et al., 2019). Qualifying conditions (QCs) are defined as conditions that would benefit from the use of MM and these also vary from state-to-state (Johns, 2015). More research needs to be done to account for inconsistency among QCs when applying policy.

Medical marijuana is a controversial form of treatment at both state and federal levels, and therefore it is necessary to take a closer look at its uses due to this conflict in policies. As of December 6, 2018, MM is legal in the state of Missouri according to Article XIV, Section 1 of the Missouri Constitution (MO Const. Art. XIV, § 1). Since this policy will have a widespread impact on the state, it is important to understand what this means for patients seeking such alternative treatment.

According to current federal law, marijuana is still an illicit drug under the Controlled Substances Act (CSA) as it contrasts with states that have already begun implementing policies that allow MM (Klieger et al., 2017). This discrepancy in MMLs creates restricted access to MM, even if a policy is in place. Patients with QCs for MM once it is legalized likely do not have proper access. If it is to be used by states for its medicinal properties, there should be proper access (Fischer et al., 2015).

Additionally, there is a gap in healthcare provider knowledge on MM due to the novelty of policy regarding cannabis access for medicinal purposes. Due to policy variance, it is

important for healthcare professionals to understand the proper uses of MM, along with state MMLs of the state in which a patient resides (Bigand et al., 2019). Also, previous research shows 90% of students surveyed wanted more MM education in the curriculum (Moeller and Woods, 2015). This highlights the need for relevant MM education for healthcare workers and students, and could lead to the development of proper curricula for those pursuing healthcare professions (Moeller et al., 2020). With further education about MM and the legality of its use, healthcare workers could better prepare and advocate for patients seeking MM and help them make an informed decision (Szaflarski et al., 2020).

Therefore, the purpose of this study was to assess the current personal knowledge and perceptions of medical marijuana and its regulations among local healthcare workers and healthcare students in the state of Missouri. In states that pass medical marijuana laws (MMLs), there is variance in implementation of that policy so healthcare workers should acquire some understanding of MM and their state's policies. There are significant gaps in healthcare provider and student knowledge within the research on the health effects of cannabis and cannabinoids (Moeller et al., 2020; Szaflarski et al., 2020).

## **Research Questions**

1. What is the reliability and validity of a 31-item scale regarding perceptions and confidence of medical and recreational cannabis for Missouri current and future healthcare workers?
2. What is the difference in current knowledge and perceptions of MMLs among Missouri healthcare workers and students of varying genders?

3. What is the current level of understanding of healthcare students regarding medical marijuana laws?

### **Research Hypotheses**

1. It is hypothesized that this scale will be valid and reliable for use among Missouri current and future healthcare workers.
2. It is hypothesized that there will be a difference in current knowledge and perception of the state's regulations regarding MMLs between class and gender of healthcare workers since policy adoption.
3. It is hypothesized that there will be significant differences in knowledge and perceptions of MMLs among healthcare students.

### **Delimitations**

1. This study utilized participants from local healthcare workers and current healthcare students in the state of Missouri.
2. The employees involved in this study were currently employed in the healthcare industry or enrolled as a student in a healthcare program and involved in some capacity of coming into contact with a current patient.
3. Both men and women were given the survey.
4. Participants of varying cultural backgrounds were surveyed.

### **Assumptions**

1. Participants answered questions honestly on the surveys.
2. Participants did not discuss the content of the survey with anyone else.
3. Participants who took part in the qualitative survey did not discuss this information with one another outside of the interview itself.

## **Operational Definitions**

1. Medical Marijuana – term for use of the *Cannabis* plant for medicinal purposes (Moeller & Woods, 2015)
2. Medical Marijuana Laws - decriminalize marijuana on the basis of medicinal use (National Conference of State Legislatures, 2020)
3. Healthcare worker – any healthcare provider or student including: medical doctors, physician assistants, CRNAs, nurse practitioners, nurses, pharmacists (Szaflarski et al., 2020)

## **Significance of Study**

Currently, there is a need to assess current knowledge and perceptions of MM among healthcare workers. This may identify potential needs for health education about the proper uses of MM for patients. It is important that individuals seeking alternative treatments are well informed about the treatment. This study gathered data for research on state MMLs influence within the healthcare industry in the state of Missouri. The present study added to current research by considering the effect of MM policy within a specific timeframe upon healthcare workers and healthcare students. The implications of such information could help guide future research of cannabis and its medicinal use. More research is needed to understand the implications of legalizing and utilizing MM as treatment. There needs to be consistency among guidelines, therapeutics, and information provided to patients since it is a rapidly growing industry.

## LITERATURE REVIEW

The literature related to healthcare workers' perceptions of MM is outlined in this chapter. The literature presented is organized into the following categories: medical marijuana, medical marijuana programs and its qualifying conditions, medical marijuana laws, including federal and state policies, perceptions/measures of medical marijuana and healthcare workers' knowledge and perception of medical marijuana.

As of November of 2018, medical marijuana (MM) became legal in Missouri. With the state of Missouri now allowing, "patients with serious illness and medical conditions" access to MM under direct physician supervision (MO Const. Art. XIV, § 1). This amendment to the Missouri Constitution also protects patients from any civil and criminal penalty while granting permission for legal production, sale, and purchase for medical purposes. The protection also covers primary caregivers and physicians from any penalty. It is important for healthcare workers to understand what MM is, how it affects users, and the policies that are now in place. Since this policy will have a widespread impact on the state, there is a need to assess what impact the policy will have on current perceptions of MM among healthcare workers.

### **Marijuana**

**The Cannabis Plant.** "Cannabis" is a general term used to reference a variety of organic products that come from the *Cannabis Sativa* plant (*Health Effects*, 2017, p. 38). "Marijuana" is a term used to reference the flowering plant referred to as *Cannabis Sativa* (*Health Effects*, 2017, p. 38). Missouri's definition of marijuana includes *Cannabis Sativa*, *Cannabis Indica*, and *Cannabis ruderalis* and other hybrids as deemed within the scientific community along with extracted resin and marijuana-infused products (MO Const. Art. XIV, § 1). The flowering part of

the plant contains over 104 psychoactive compounds called cannabinoids which includes: tetrahydrocannabinol (THC) (*Health Effects*, 2017, p. 44). This compound, THC, is the most well-known as it is attributed to eliciting a “perceived high” once cannabis is smoked or ingested (*Health Effects*, 2017, p. 51). Another cannabis compound that is isolated is called cannabidiol (CBD), which contains antioxidant and anti-inflammatory properties and lacks the intoxicating effects of THC (*Health Effects*, 2017, p. 47). This compound has potential in treating conditions such as epilepsy, anxiety, seizures, psychosis and other neurological disorders (*Health Effects*, 2017, p. 47).

**History.** Recent discoveries of some of the earliest Cannabis use dating back approximately 2,500 years ago, were discovered in the Pamir region (Ren et al., 2019). The researchers claim there is evidence for cannabis use for ceremonial or ritual purposes. While cannabis has been “used for centuries” to treat various ailments, other recorded uses from the early 19th century include: tetanus, mental disorders, and other convulsive diseases (*Health Effects*, 2017, p. 43). This historical perspective paved the foundation for current uses of cannabis as a recreational drug and an alternative medicinal treatment.

**Uses of Cannabis.** Cannabis may be smoked, vaporized, consumed, topically, or as an extract for oral use (Todaro, 2012). From ritual to treatment, research shows cannabis/marijuana being used for a wide range of conditions. Evidence for therapeutic uses of cannabis/marijuana and oral cannabinoids, range from treatment for chronic pain, nausea and vomiting due to chemotherapy, weight loss associated with HIV/AIDS, and spasticity issues related to Multiple Sclerosis (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.128).

## **Medical Marijuana**

**Therapeutic Effects.** Literature on the term, ‘Medical Marijuana (MM)’ is the term for use of the *Cannabis* plant for medicinal purposes (Moeller & Woods, 2015). Therapeutic use of MM is known to be controversial because of its unknown short and long-term side effects such as: possible increased risk of cancer, cardiometabolic risk, respiratory disease, and decreased immune function (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.141).

Potential uses for MM include reduction of symptoms related to chemotherapy treatments, reduction of chronic pain and prescription of opioids (Bigand et al., 2019). Other commonly recognized health issues or problems that MM may have beneficial uses are cancer, human immunodeficiency virus or acquired immune deficiency syndrome, multiple sclerosis, and glaucoma (NCSL, 2020). Patients with serious side effects from chemotherapy, weight loss accompanying cancer, and AIDS and chronic pain are still using marijuana (Todaro, 2012).

Since individuals with serious illnesses like cancer seek relief using MM, it’s imperative to identify reasons for use. A survey of patients registered for MM in Georgia found advanced cancer (76%) as the most common reason for use (Singh et al., 2019). Georgia is one of the states with restricted MMLs that only allow low tetrahydrocannabinol (THC) oil (Singh et al., 2019). Of those respondents in the survey, 49.5% self-reported using those low-THC products as their method for MM use. Another survey of cancer patients using MM found the preferred method of use as dried leaves (81%) or oils/edibles (41%) (Martell et al., 2018).

Research has demonstrated various perceived effects of MM concurrent with other medication for pain. Additionally, a survey on the perceived effects of cannabis were self-reported by individuals who also used prescription opioids for pain management/relief (Bigand et al., 2019). There were 150 participants that all had been previously diagnosed with a pain condition. Some beneficial effects that were reported included pain relief, calming to some, and



improvement in mood and negative reactions included decreased motivation, too costly, poor memory, and fatigue (Bigand et al., 2019). Recognizing those effects MM has on patients with pain is beneficial to the current research and potential uses of cannabis.

**Approved Medications.** The first cannabidiol drug was approved by the Food and Drug Administration (FDA) in 2018 for treatment of Dravet syndrome or Lennox-Gastaut syndrome (Abu-Sawwa, 2020). Published results of a study done using Epidiolex, a CBD-based therapy, along with anti-epileptic medication to treat patients with certain types of seizures from Lennox-Gastaut syndrome indicated positive results (Devinsky et al., 2018). This study was done as a double-blind, placebo-controlled study dividing cannabidiol (CBD) doses into two groups; 20mg or 10mg dose per kilogram of body weight, twice a day for 14 weeks. Results for the 20mg dose group saw 41.9% reduction in seizures and 10 mg dose group 37.2% reduction vs. 17.2% placebo ( $p=.005$  20mg vs. placebo;  $p=.002$  10mg vs. placebo). These results show using the CBD-based therapy significantly decreased drop seizures more than using just a placebo (Devinsky et al., 2018). Another study using Epidiolex, for treatment of seizures in patients with Tuberous Sclerosis Complex (TSC) also showed the CBD-based therapy significantly reduced TSC-associated seizures vs. placebo over a period of 16 weeks (Thiele et al., 2020).

Missouri's approved use allows for MM in the forms of: marijuana-infused products (capsules, teas, oils, food products), dried flowers, buds, plant material, extracts, or oils (for smoking/vaporization), topical products (ointments, balms, or transdermal patches), suppositories, or any other means under physician supervision (MO Const. Art. XIV, § 2).

**Prevalence of Use.** Current data trends show marijuana use is on the rise. Data from the National Survey on Drug Use and Health (NSDUH) in 2019, previous use of recreational marijuana at 46.2% among persons aged 12 or older (NSDUH, 2019). A survey of adults (18 or

older) at cancer treatment centers in Canada self-reported use of cannabis among cancer patients. Out of 1,928 responses, 43% reported using cannabis at some point in their lifetime (Martell et al., 2018).

Research on reported MM use shows it's also on the rise. A study that analyzed data from the National Survey on Drug Use and Health (NSDUH) found that US adults MM use increased from 1.2% in 2013 to 1.6% in 2015 ( $p = .0007$ ) (Han et al., 2018). It was also shown that US adults in MM states were 1.3 times more likely to use MM in 2015 than 2013. US adults in non-MM states were 1.4 times more likely to report MM use in 2015 vs. 2013 (Han et al., 2018). Regardless of state, MM use was shown to increase from 2013 to 2015.

With an increase in states adopting MMLs, the impact of creating greater access to MM within a state must be addressed. There is a gap in research on the effects legalization will have on prevalence of marijuana use and use disorders (Pacula & Smart, 2019). Research on early MMLs may indicate that increased access impacted a small population of high-risk, heavy users (Pacula and Smart, 2019). Within Colorado's population of marijuana users, 6.1% are daily or near-daily users and they are buying 75.7% of products (Stuyt, 2020). Using Colorado as a model, predictions have estimated Missouri estimates 2-3% of its population will apply for the state's MM identification card for access (Lofton, 2019).

**Health Effects.** The various health effects of cannabis use have been researched in regards to various conditions. There is unclear evidence regarding the medicinal effects of cannabis use in those with heart attack, stroke, and diabetes (NASEM, *The Health Effects of Cannabis and Cannabinoids*, 2017, p.161). With limited evidence between smoking cannabis/marijuana and a link to being the possible cause of heart attack and certain strokes (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.166 & 170). Evidence suggests smoking

cannabis/marijuana does not increase risk for certain cancers (lung, neck and head) in adults (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.141).

Chronic smoking of cannabis/marijuana is associated with certain respiratory symptoms (chronic cough and phlegm) (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.181).

Cessation of this use is likely to reduce these symptoms. It remains unclear whether cannabis/marijuana use is associated with certain respiratory illnesses including Chronic Obstructive Pulmonary Disorder (COPD) and asthma or worsened lung function (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.181).

Insufficient data exists on the effects of cannabis or CBD-based therapeutics on immunity (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.199). Due to this, there is a lack of research to draw conclusions about the association between cannabis or CBD and the immune system. There is also a lack of evidence regarding the effects between cannabis and immune status of individuals with HIV (*The Health Effects of Cannabis and Cannabinoids*, 2017, p.199).

Research shows there are potentially serious harmful effects for children exposed to cannabis. Accidental ingestion of cannabis by young children can result in respiratory failure and coma, as noted per several case reports and children are at an increased risk of accidental cannabis overdose injury in states with legal use (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 217). Also, smoking cannabis during pregnancy is linked to lower birth weight in offspring (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 245). This shows pediatric populations are at an increased risk of the health effects of cannabis/marijuana exposure.

Cannabis/marijuana use has also shown to affect cognitive functioning within 24 hours and to impair academics, employment, income, and social relationships among adolescents (*The*

*Health Effects of Cannabis and Cannabinoids*, 2017, p. 267). Cannabis/marijuana use may increase the possibility of developing schizophrenia or other psychoses and social anxiety disorder, with increased use presenting further risk (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 289). However, this does not seem the case for other mental health problems like anxiety, depression, and post-traumatic stress disorder (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 289). Individuals with bipolar disorders can increase bipolar symptoms with everyday use (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 289). Heavy use of cannabis/marijuana can increase reported suicidal thoughts than nonusers (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 289). There is an increased risk for problem usage when cannabis/marijuana use begins at an earlier age and as the frequency of use increases (*The Health Effects of Cannabis and Cannabinoids*, 2017, p. 333).

**Medical Marijuana Programs (MMPs).** In 1996, California passed Proposition 215 which was the first state to make an allowance for MM (NCSL, 2020). This was the first state to address emerging public health concerns related to MM, and the first example of a Medical Marijuana Program, which have been enacted in other countries to allow use of marijuana for people with qualifying medical conditions (Fischer et al., 2015). One instance of this allowance in the United States was the state of Pennsylvania, as of May 2018, approved cannabis as a treatment for certain cases of opioid use disorder (Tilburg et al., 2019). Fischer et al. (2015) examined the impact of MMPs; with the majority of participants being individuals with chronic and debilitating conditions and many noting better health status/outcomes. These MMPs did show evidence of lower pain scores in patients, decrease in risky drug use, and reduced the number of prescription opioid overdoses (Fischer et al., 2015). Although the use of marijuana is allowed for therapeutic purposes, this is not without controversy, as problems can stem from

such MMPs (Fischer et al., 2015). A study by Shover and colleagues shows a 22.7% increase in opioid overdose mortality in states that have implemented laws for MM. Since MMPs are a relatively new area of research, there is limited evidence regarding potential benefits of MMPs from a population health perspective. Overall, it was found that evidence for potential population health effects was limited and MMPs came from political and legal struggles due to possible reduced health care needs or utilization. Also, the illegal status of cannabis has significantly hampered research (Fischer et al., 2015).

To observe usage rates, researchers have asked patients to self-report whether they use MM. One survey of patients using prescription opioids for pain found 69.3% had previously used cannabis, while only 10.7% were registered MM patients (Bigand et al., 2019). Another study referenced data supporting MMLs in some states have shown MM as an alternative pain medicine to decrease opioid prescriptions among patients with subsidized health insurance (Tilburg et al., 2019). With an increase of research, allowances for MM are being made based on certain medical conditions. For example, there are varying levels of THC allowed within state MMPs (NCSL, 2020). While some MMPs allow marijuana use for those with qualifying medical conditions; some states have restricted access to use "low-THC, high cannabidiol (CBD)" products for limited medical reasons (Johns, 2015).

**Qualifying Conditions.** Qualifying conditions (QCs) are defined as conditions that would benefit from the use of MM and these also vary from state-to-state (Johns, 2015). Previous research on QCs covers what health issues or problems may benefit from MM as a therapy. Currently, the most commonly recognized health issues or problems that are considered QCs include: cancer, human immunodeficiency virus or acquired immune deficiency syndrome, multiple sclerosis, and glaucoma (NCSL, 2020).

Article XIV of the Missouri Constitution details which “Qualifying Patients,” or those that live in Missouri with diagnosed QCs, are granted access to MM. These conditions are:

Cancer, epilepsy, glaucoma, intractable migraines unresponsive to other treatment. A chronic medical condition that causes severe, persistent pain or persistent muscle spasms, including but not limited to those associated with multiple sclerosis, seizures, Parkinson's disease, and Tourette's syndrome. Debilitating psychiatric disorders, including, but not limited to, posttraumatic stress disorder, if diagnosed by a state licensed psychiatrist. Human immunodeficiency virus or acquired immune deficiency syndrome. A chronic medical condition that is normally treated with a prescription medication that could lead to physical or psychological dependence, when a physician determines that medical use of marijuana could be effective in treating that condition and would serve as a safer alternative to the prescription medication. Any terminal illness; or in the professional judgment of a physician, any other chronic, debilitating or other medical condition, including, but not limited to, hepatitis C, amyotrophic lateral sclerosis, inflammatory bowel disease, Crohn's disease, Huntington's disease, autism, neuropathies, sickle cell anemia, agitation of Alzheimer's disease, cachexia, and wasting syndrome (MO Const. Art. XIV, § 1).

Patients with QCs in Missouri are protected to discuss MM with their physician about the possible benefits, seek their professional medical advice, and use it as treatment under medical supervision (MO Const. Art. XIV, § 1).

## **Medical Marijuana Laws**

**Overview of Cannabis Regulation.** According to US policymakers, marijuana's purported medicinal use conflicts with federal regulation. Thus a petition was filed with the Drug Enforcement Agency (DEA) to consider rescheduling marijuana. Therefore, in 2016, the DEA chose to keep marijuana as a Schedule I substance, as this designation restricts marijuana due to "high potential for abuse" and "no currently accepted medical use" (DEA; Bessette, 2016). While State Medical Marijuana Laws (MMLs) decriminalize marijuana on the basis of medicinal use; currently, there are 36 states and 4 territories with MMPs (NCSL, 2020). With 36 states having MMLs and federal restrictions in place, research should consider the effects these policies have on people's perceptions on MM that are vital to inform these policies moving forward (Pacula & Smart, 2019).

With lack of federal guidance for creating and implementing MMLs, policy design is left to the individual state, and previous models were used to deal with unwanted issues (Klieger et al., 2017). Previous research has attempted to identify causes to the variance of MMLs, which is used to inform the public and policy makers, and to predict the trend of policy for future states (Kim et al., 2019; Pacula & Smart, 2019). States with MMLs also increased tax revenue and jobs which show influencing factors that continue the trend of policy liberalization (Kim et al., 2019).

Also, research has shown policymakers are turning to cannabis in relation to public health law and policy. For example, in 2018, Pennsylvania made allowances for MM as a treatment for opioid use disorder due to data showing MMLs in some states have shown to decrease opioid prescriptions among patients with subsidized health insurance (Tilburg et al., 2019). Because of the emerging evidence it was posed that the US government should consider reassessment of its federal scheduling of cannabis (Tilburg et al., 2019).

However, there are still concerns for patients, product safety, and dispensaries (Klieger et al., 2017). Due to the newness of these policies, another gap in research is related to how many patients are registering with the states once MMLs have been passed (Pacula & Smart, 2019). A survey of three pain management clinics in Washington state, showed of the patients who used opioid medications for pain and reported using cannabis, only 10.7% were registered as a MM patient (Bigand et al., 2019). In time, tracking these patient registration rates should show an accurate depiction of the proportion of patients utilizing MM (Pacula & Smart, 2019).

Missouri will use identification cards along with a physician certification for qualifying patients and caregivers to register its MM users (MO Const. Art. XIV, § 3). Once registered, access is granted for one year and renewal of this card is required on an annual basis (MO Const. Art. XIV, § 3). Predictions have estimated Missouri will see 2-3% of its population apply for the state's MM identification card for legal use (Lofton, 2019).

**Federal Policy.** According to current federal law, marijuana is a Schedule I drug under the Controlled Substances Act (CSA) as it contrasts with states that have already begun implementing policies that allow MM (Klieger et al., 2017). This discrepancy in MMLs creates restricted access to MM, even if a policy is in place. Patients with QCs for MM once it is legalized likely do not have proper access. If it is to be used by states for its medicinal properties, there should be proper access (Fischer et al., 2015).

**Executive Branch Policies.** Executive Branch Policy has followed this liberalization trend while maintaining the federal status quo of MM policy. In October of 2009, President Obama's Administration communicated to federal prosecutors to discourage prosecution of MM in agreement with state laws (NCSL, 2020). This memorandum from Deputy Attorney General David W. Ogden detailed how the Department of Justice would allocate its resources to focus on



stopping illegal drug trafficking and manufacturing (U.S. DOJ, 2009). These guidelines were outlined for prosecutors in states that authorized medical use of marijuana at the time and indicated a shift in focus of prosecution without legalizing MM.

Then in 2013, Deputy Attorney General James M. Cole, released another memorandum on the subject of Marijuana Enforcement Policy which detailed eight different enforcement priorities (U.S. DOJ, 2013). These similarly reiterated issues dealt with illegal sale, distribution, and trafficking of marijuana. It also mentioned restricting marijuana from minors, “drugged driving”, growing or possession on federal property/land, and using it as a means for funding other criminal activity. Again, it reinforced the federal scheduling of the CSA while relying on state and local law enforcement to regulate various marijuana activities (U.S. DOJ, 2013).

An example of this is the state of Colorado has included law enforcement in the strategies for implementing cannabis laws (Johns, 2015). It was indicated that 95.5% of cities allowing Recreational Marijuana Laws (RMLs) were including law enforcement in the “planning process” and 77.3% of cities in the “enforcement” of such policies (Johns, 2015). Other research identified that racial disparities may exist in criminal enforcement and minorities involved in the cannabis market. An example is given of policy in Ohio that distributed 15% of licenses to cultivate medical cannabis were granted to minority applicants (Tilburg et al., 2019). This is significant as these laws will have a direct impact on the criminality of cannabis.

Recently, federal status of marijuana as a Schedule I drug according to the Drug Enforcement Agency (DEA), was once again reconfirmed in federal hearings (Bessette, 2016). This classification was explained by the DEA as, "marijuana does not have a currently accepted medical use in treatment in the United States" and "at this time, the known risks of marijuana use have not been shown to be outweighed by specific benefits in well-controlled clinical trials that

scientifically evaluate safety and efficacy" (Bessette, 2016). Due to the lack of federal and state agreement on drug classification and appropriate use of MM, research on the topic is limited (Tilburg et al., 2019). Because federal guidelines outlaw marijuana, this remains a hindrance to its possible uses and further research.

**Congressional Branch Policies.** As recently as December 2020, in the U.S., The House of Representatives voted in favor of a bill called Marijuana Opportunity, Reinvestment, and Expungement Act (MORE) which would reschedule and decriminalize marijuana on a federal level (H.R. 3884, 116th Congress, 2020). This bill is yet to be presented to the U.S. Senate and marks a significant piece of legislation regarding the federal stance on MM.

**State Policy.** Marijuana legalization is contingent on the basis of medicinal use in 36 U.S. states that have enacted MMLs (NCSL, 2020). Medical Marijuana Laws decriminalize marijuana on the basis of medicinal use. Missouri passed a state amendment to protect patients and caregivers that use marijuana for medicinal purposes and does not change any policy regarding nonmedical use (MO Const. Art. XIV, § 1). So while MMLs allow for medicinal use, statutes on non-medical use remain unchanged in Missouri at the time of this review.

With lack of federal guidance for creating and implementing MMLs, policy design is left to the individual state. One study examined common factors between 33 state MMLs based upon their ‘strictness’ from 0 to 3; showing later adopting states were less restrictive and some relationship between state government beliefs and fiscal health led to more tolerance in policy (Kim et al., 2019). Due to this autonomy, there is state-to-state variance of MMLs with varying definitions of patient access, possession, QCs, and prior policy as models to implement (Klieger et al., 2017). Qualifying conditions are defined as conditions that would benefit from the use of MM and these also vary from state-to-state (Johns, 2015). While there are some commonly

recognized health issues or problems that are considered QCs like cancer, human immunodeficiency virus or acquired immune deficiency syndrome, multiple sclerosis, and glaucoma; states must define their own regulations on MM through policy regarding these topics (NCSL, 2020). Due to state MMLs variance, there is a need for consistency among state's definitions of QCs to account for who has access when applying policy.

Patient access covers how someone is allowed to acquire MM. According to Missouri statutes, how qualifying patients gain access to MM is via an identification card or physician certification (MO Const. Art. XIV, § 3). Patients are also allowed to cultivate up to six flowering cannabis plants for private use via a separate identification card at an additional cost (MO Const. Art. XIV, § 3). Missouri defines a possession limit for patients as a 60-day supply or 4 ounces of dried, unprocessed marijuana or its equivalent (MO Const. Art. XIV, § 3).

One study found that MMLs already in place were used as models for policy design when states decide to implement their own regulations (Kim et al., 2019). This included defining possession limits which is how much MM is allowed at any given point for a patient to have on their persons (Kim et al., 2019). It was also shown that states adopted CBD-only laws after 2014 classifying a medicalized trend in MMLs (Pacula & Smart, 2019). For this reason, there should be consistency among state policy and regulations of MM for proper implementation.

The liberalization trend among states has led to some states implementing RMLs once MMLs are in place. One such study of RMLs was done in Colorado among counties that allow for recreational use of marijuana (Johns, 2015). A survey was performed requesting information from 22 different counties in Colorado as to whether recreational marijuana was legalized. It was found that 88% of cities that passed MM also passed RMLs (Johns, 2015). If a county did implement, the survey then asked for information regarding reasons why it passed and any

problems that occurred. This information was able to show some impact of prior policy on outcomes of cities allowing recreational marijuana.

Once a state decides to pass RMLs, the effects on neighboring states' policies should be considered. Another study attempted to examine the impact of legalizing recreational marijuana (RML) use in the states of Colorado and Washington and the effect it has on the number of marijuana arrests there and the states bordering (Hao & Cowan, 2020). Bordering states showed an increase in the prevalence rate from 10.64% to 12.32% following the passage of RMLs (Hao & Cowan, 2020). Annual law enforcement costs in bordering counties related to RMLs and marijuana arrests were averaged to increase \$334,000 in Colorado and \$2,164,050 in Washington (Hao & Cowan, 2020). So there are increased law enforcement costs to consider with the passage of such RMLs.

One study examined conflicts of interest (COI) regulations in states that have legalized MM and adult use (Bowling & Glantz, 2019). There were three surveys done to collect data on states specific policy adopted as of April 30, 2018. It was found that 6 of 30 states had explicit policies covering conflicts of interests of government employees and MM. Further, 7 of 30 had regulations not allowing public employees to hold cannabis licenses. There were 24 states that had conflicts of interest policy listed under the general ethics section. In seven of eight states with adult use policy, COI was covered in cannabis specific regulations. This information should provide context for states moving forward with MM and adult use policy implementation and how to write COI regulations for their state's officials.

As more tolerant MMLs are implemented, it is also important to understand the widespread effect on younger populations including students. One study explored how MMLs may have affected student's time management (Chu & Gershenson, 2018). This was done by

analyzing data on student's time use from the American Time Use Survey (ATUS). The results were not significant among high school or full-time college students. However, part-time college students spent an average of 42 and 37 minutes less on homework and class attendance in states post MMLs (Chu & Gershenson, 2018). Another study analyzed data from the 2000 Census and 2001-2014 American Community Surveys to examine the impacts of MMLs on education (Plunk et al., 2016). The sample population was students in the ages 14-18 from 1990-2012 (n=5,483,715). Results showed students had increases in probability of not completing 12<sup>th</sup> grade with a diploma or GED (3.99% to 4.39%), not enrolling in college (31.12% to 32.96%), or finishing their college degrees (45.30% to 46.15%) when exposed to MMLs (Plunk et al., 2016).

Klieger and colleagues (2017) focused on state MMLs effective January 1, 2014, on rules for patients, product safety, and dispensaries. The method used was a cross-sectional analysis of laws implemented before February 1, 2017. It was indicated that previous models were being used to deal with unwanted issues developing due to policy. Three indexes were created to identify differences in specific QCs among state's MMLs and variance in policy was surveyed to account for inconsistencies in implementation and compared against normal federal regulations used for traditional medicine. It was pointed out that since MM lacks approval by the US Food and Drug Administration (FDA), state MMLs allow therapeutic use of a drug with no "national standardization in the doses and ingredients" (Klieger et al., 2017). Due to a lack of government regulation, THC content of cannabis plants has risen to an average of 18.8% and 69.4% up to 95% in concentrated products (Stuyt, 2020). Stuyt also points out that research shows these high THC products have been shown to cause serious mental health issues such as addiction, psychosis, depression, anxiety, sleep problems, suicide, and violence.

In Missouri, there is a provision that requires a “seed-to-sale” tracking system for MM/infused products to strictly come from a MM dispensary facility (MO Const. Art. XIV, § 3d). This is to track purity standards from dispensary facility to sale of any MM products. Also, it has been posed that Missouri should limit the potency to less than 10% THC (Stuyt, 2020).

## **Public Opinion**

### **Perceptions of Medical Marijuana Laws**

Passage of MMLs show perceptions of MM use in the U.S. is shifting. Due to this, it is critical to examine perceptions of MMLs within the state once policy is applied. A recent poll of 1,035 US adults done by Gallup showed 68% were in favor of legalizing recreational use of marijuana (Brenan, 2020). The Gallup polls have been surveying perceptions of medical marijuana since 1969, with those in favor at 12% of responses during that time (Brenan, 2020). Statistics from the National Survey on Drug Use and Health (NSDUH) by the Substance Abuse and Mental Health Services Administration (SAMHSA), also show marijuana use increased in adults aged 26 and older and disordered use significantly increased in adolescents (NSDUH, 2019).

Due to varying levels of knowledge, a health education curriculum on medical cannabis needs to be developed in order to educate healthcare students on the subject of cannabis, cannabinoids, MM, and MMLs. States with MMLs have shown few impacts on knowledge among healthcare providers (Szaflarski et al., 2020). One study was done with pharmacy students to test their knowledge of indications for MM and the two QCs most correctly identified were cancer (91%) and glaucoma (57%) (Moeller & Woods, 2015). The survey covered knowledge and experience of MM, possible QCs, and potential benefits and side effects. Results

showed an increase of knowledge between first year and third year pharmacy students of MM use for cancer. When students were asked about instruction given on MM, the majority of students did not feel comfortable with their personal knowledge. Most students in the survey were in favor of MMLs, stated there was little to no education being given on the subject, and 90% believed it should be included in their studies. This survey shows evidence of the need for MM education among students in the healthcare industry (Moeller & Woods, 2015). Another more recent survey of 629 pharmacy students showed over 80% view MM as safe and 91% in favor of national legalization (Moeller et al., 2020). In the same study 15% of students stated they received adequate education on MM. Education for prescribers should include negative effects of marijuana and consider scope of practice when giving patients advice (Stuyt, 2020).

A survey taken with patients with a history of drug abuse and chronic pain not associated with cancer (CNCP) in San Francisco Bay Area, California, used open-ended questions for the perspectives of patients and clinicians as a treatment for pain (Cooke et al., 2019). Patients gave mixed answers on cannabis use and its perceived benefits and potential abuse. A patient expressly stated sobriety concerns as they described an occasion of relapse by using marijuana. Clinicians were also concerned about potential exacerbation of mental health issues from cannabis use. Clinicians stated lack of research and perceptions as barriers to offering MM as alternative treatment. A lack of communication between clinician and patient regarding cannabis shows a need for education that properly communicates information on dosing, effects, and routes of administration for those using it to manage pain (Cooke et al., 2019). This survey adds to evidence of current lack of research and minimal standards available to use with MM.

**Measurement of MML Perceptions.** Previous research on measured perceptions of MM among healthcare providers showed lacking knowledge on content, effects, and legality of

cannabis/medical cannabis (Moeller et al., 2020; Szaflarski et al., 2020). A study that surveyed healthcare workers nationwide found over 80% of healthcare providers favored federal and state allowance of MM, 43% were in favor of RML, and 68% didn't know how many phytocannabinoids are in cannabis (Szaflarski et al., 2020). It was also found states with MMLs had little association with participants' knowledge of cannabis (Szaflarski et al., 2020).

The survey done by Moeller (2020) will be used to measure Missouri healthcare workers' and students' perceptions and knowledge of MMLs in the present study. This study surveyed pharmacy students regarding their perceptions of MM using a Likert scale method. The first section covered students own comprehension and personal experience with MM. The second section asked students to identify possible QCs of MM and its potential benefits and side effects. And students were asked about previous instruction given on MM. This survey found evidence of more education on MM is needed among those in the healthcare industry.

It is important to study perceptions of MM due to rapid expansion in MMLs among states in the U.S. Current research on MM shows knowledge gaps among healthcare workers (Szaflarski et al., 2020). There is also a need for proper MM health education due to the development of CBD-based therapies. The potential benefits/risks should be properly communicated to patients to mitigate unsafe practices such as self-treatment (Sarvet et al., 2018). Further, a proper curriculum should be administered to those in health professional schools to create a better understanding for future healthcare workers (Moeller et al., 2020). This study will collect survey data that should provide a current understanding of Missouri healthcare workers' knowledge and perceptions of MMLs. Mixed policies among state and federal agencies leave the legal landscape of MM difficult for patients to understand. This will add to current research of



MM and be utilized to help clarify how policy impacts the healthcare industry within the state of Missouri.

## **METHODS**

The purpose of this study was to assess current perceptions and knowledge of medical marijuana laws of healthcare workers and healthcare students in the state of Missouri. Data were collected through an online self-report survey. This chapter includes a description of the research participants, measures, procedures, and methods of analyses. This study was approved by the Institutional Review Board on February 4<sup>th</sup>, 2021 (IRB-FY2021-420) (Appendix B).

### **Participants**

Participants for this survey were gathered from the population of local healthcare workers and students currently residing in Missouri. The definition of “healthcare worker” or “healthcare student” according to Szaflarski and colleagues (2020) included any healthcare worker or student among the following: medical doctors, physician assistants, CRNAs, nurse practitioners, nurses, or pharmacists. This is consistent with the classes of healthcare workers allowed to administer MM in the state of Missouri. Any adult over the age of 18 was eligible to take this survey.

### **Survey Measures**

The survey presented is in two different sections (Appendix A). The first section consists of 25 questions, which covered demographic information and healthcare workers and students own comprehension and personal experience with MM. Demographic information regarding type of healthcare provider, level of education (highest professional degree), workplace setting, workplace policy for administration of medical cannabis, age, gender, race, ethnicity, and geographic location was collected. Questions regarding personal history and use of recreational and medical marijuana were also asked. Students were also asked about instruction given on MM

in their respective healthcare programs. The second part of the survey assessed healthcare workers' and students' perceptions, attitudes, and knowledge are concerning Medical Cannabis, policy, uses, and effects with 31 Likert-scale questions (Moeller et al., 2020). This section also asked students and healthcare workers to identify their knowledge and preferences relative to MM legalization, current workplace MM policy, and patient preferences for MM use. These questions cover medical and recreational uses and their own ability to answer questions on medical marijuana information. The attitudes and perceptions scale is scored out of 5, ranging from (1 - "strongly disagree", 2 - "disagree", 3 - "neutral", 4 - "agree", to 5 - "strongly agree"). This scale developed by Moeller and colleagues (2015) has been used in previous research, however, there has been no published reliability and validity testing results.

## **Procedures**

Prior to collecting any data, approval from the Institutional Review Board of Missouri State University was obtained. Convenience sampling were used to collect data in this study. Participants were recruited via email, word of mouth, and social media (i.e. *Twitter*, *Facebook*, *Instagram*). Initial data were collected from participants via an anonymous online survey administered through Qualtrics. All participants were notified this was a voluntary study and told they could withdraw at any time during the survey. Each participant also gave electronic consent prior to starting the survey. Those who consented to participate were asked to complete an anonymous self-administered online survey including demographic information and self-reported information. Next concerning participants' current perceived knowledge of cannabis, cannabis compounds, cannabis-based therapies, need for education, and current federal law. Attitudes were assessed regarding Missouri's current legalization of medical marijuana, whether to pass

federal medicinal and recreational marijuana laws, the effects of cannabis-based therapies, and current statutes. These surveys took approximately 15 minutes to complete.

### **Data Analysis**

Data were further analyzed using the SPSS v.26 (*IBM Corporation, 2020*). Descriptive statistics were run for all demographic questions. Psychometric analysis was used to assess the reliability and validity of the attitudes and perceptions survey via factor analysis to determine the scale dimensionality and internal consistency producing a Cronbach's alpha score. Independent samples t-tests were conducted to examine mean differences among gender of healthcare workers and students, and among categorizations of healthcare students versus healthcare professionals. One-way ANOVAs were performed to determine if classes of healthcare workers and students were significantly different from each other regarding attitudes and perception of medical marijuana laws. The alpha level was set at .05 to determine statistical significance.

## RESULTS

A total of 61 participants that accessed the survey with 7 responses that were excluded due to incomplete survey or due to location outside of Missouri. Based on survey response, there were five groups of healthcare workers or student participants. They were categorized as Nurse, Nurse Practitioner (NP)/Nurse anesthetist (CRNA), Physician Assistant (PA)/Medical Doctor (MD), Student, or Other. The sample was comprised of 44 (81.5%) females and 10 (18.5%) males and based on occupation, 21 (38.9%) participants were students, 16 (29.6%) were nurses, 6 (11.1%) other, 5 (9.3%) PAs, 3 (5.6%) NPs, 2 (3.7%) CRNAs, and 1 (1.9%) was a MD. Demographics, occupation, tenure, and work setting can be found in Table 1. Frequency of occupation among genders are found in Table 2. Perceptions, experiences, and opinions regarding MM can be found in Table 3.

Table 1. Participant Demographics	Number (%)
Gender	n=54
Male	10(18.5)
Female	44(81.5)
Age	n=54
18-24	12(22.2)
25-29	8(14.8)
30-34	12(22.2)
35-39	3(5.6)
40-44	2(3.7)
45-49	2(3.7)
50-54	4(7.4)
55-59	6(11.1)
60-64	4(7.4)
Ethnicity	n=54
American Indian or Alaska Native	2(3.7)
Asian	2(3.7)
Black or African American	2(3.7)
Hispanic or Latino/a/x	4(7.4)
Native Hawaiian or Other Pacific Islander	0(0)
White	49(90.7)
Other/Prefer to Self-Describe	1(1.9)
Occupation	n=54
Medical Doctor	1(1.9)
Nurse	16(29.6)
Nurse Practitioner	3(5.6)
Physician Assistant	5(9.3)
Student or Resident	21(38.9)
CRNA	2(3.7)
Other	6(11.1)

Table 1. Participant Demographics

Student or Resident Program	n=21
Nursing	7(33.3)
Nurse Practitioner	2(9.5)
Pre-Medicine	4(19.0)
Physician Assistant	8(38.1)
Professional Tenure	n=54
Resident/trainee/student	18(33.3)
< 5 years	14(25.9)
6-10 years	8(14.8)
11-20 years	7(13.0)
21+ years	7(13.0)
Work Setting	n=54
Community Hospital	16(29.6)
Academic Hospital	8(14.8)
Private Practice	5(9.3)
Student, in clinicals or rotations	16(29.6)
Other	14(25.9)
Current Workplace MM Policy	n=53
Nursing or medical technicians must administer patient-provided product	1(1.9)
Patient must administer own supply	3(5.7)
Not allowed	26(49.1)
Other	2(3.8)
I do not know	21(39.6)
Public or Private Institution	n=20
Public	19(95.0)
Private	1(5.0)

Table 2. Occupation and Gender of Participants

	Nurse	PA/MD	NP/CRNA	Student	Other	Total (n)
Male	1	3	0	5	1	10
Female	15	3	5	16	5	44
Total	16	6	5	21	6	54

Table 3. Perceptions, Experiences, and Opinions Regarding MM

Number (%)

Family History of Substance Abuse	n=54
Yes	21(38.9)
No	33(61.1)
Personal History of Substance Abuse	n=54
Yes	3(5.6)
No	51(94.4)
Personal Marijuana Use (Medical or Non-Medical)	n=54
Yes	23(42.6)
No	31(57.4)
Known someone to use MM	n=54
Yes	39(72.2)
No	15(27.8)
Received MM Education	n=54
Yes	10(18.5)
No	44(81.5)
Received in-depth discussion of MM	n=20
Yes	1(5.0)
No	19(95.0)
Want MM Information in Healthcare Classes	n=20
Yes	18(90.0)
No	2(10.0)



Table 3. Perceptions, Experiences, and Opinions Regarding MM

MM Approved in State of Residence	n=54
Yes	45(83.3)
No	4(7.4)
I don't know	5(9.3)
Want All States to Approve MM	n=54
Yes	45(83.3)
No	9(16.7)
Legalize Recreational Marijuana	n=54
Yes	29(53.7)
No	25(46.3)
Perceived Number of States Allowing MM Use	n=53
Less than 10	4(7.5)
10-20	19(35.8)
21-30	18(34.0)
31-40	12(22.6)
Perceived Number of States Allowing Recreational Marijuana Use	n=53
Less than 10	31(58.5)
10-20	18(34.0)
21-30	3(5.7)
31-40	1(1.9)
Experiences with MM Treatment for Patients	n=53
I have had patients inquire about using MM as treatment	32(59.3)
I have prescribed medical marijuana	0(0)
I have suggested MM as a treatment option	6(11.1)
I do not feel comfortable talking to patients about MM	7(13.0)
I do not feel comfortable prescribing medical marijuana	8(14.8)
Other*	14(25.9)*

## **Reliability and Validity**

Psychometric analysis was performed to determine the reliability and validity of the 31-item scale regarding attitude and perceptions of medical and recreational cannabis for Missouri current and future healthcare workers. After initially allowing the data to determine the factor loadings using a 1.0 Eigenvalue, a forced 4-factor rotation resulted in 4 subscales with higher internal consistency values. The forced solution was determined due to low factor loading values and one item loaded independently on a single factor. The forced 4-factor solution is acceptable given the loadings and reliability of each sub-scale. Results of each subscale Cronbach's Alpha coefficient are shown in Table 4. For the Safety subscale items had outlooks on MM and its effects on children and pregnancy. There were also perceptions on the comparisons of the effects of MM in relation to tobacco, alcohol, and prescription opiates. And whether recreational use of marijuana is safe and if there are enough government resources to regulate MM. This 8-item scale, subscale had a Cronbach's Alpha of .89. The Advocacy subscale had items on attitudes about statements on MM legalization and which occupations are to be involved in the dispensing of prescriptions. This 7-item scale had a Cronbach's Alpha of .79. The Awareness subscale had items about personal knowledge of compounds in MM and whether they're comfortable speaking to patients about this subject. This 8-item scale had a Cronbach's Alpha of .70. Finally, the Misuse subscale had items of possible negative effects of legalizing MM on driving ability, crime rates, one's health, and addiction. This was an 8-item scale with a Cronbach's Alpha at .88. For survey item subscale loading see Table 5.

Table 4. Subscale Cronbach's Alpha Coefficient

Subscale	Cronbach's Alpha	N of Items
Safety	.89	8
Legalization	.79	7
Awareness	.70	8
Misuse	.88	8

Table 5. Survey Item Subscale Loading

Survey Item	Safety	Legalization	Awareness	Misuse
In my opinion, marijuana should be legalize for medicinal uses.	.315	<b>.789</b>	.078	-.064
In my opinion, all clinicians with prescribing rights (e.g. advanced nurse practitioners, physician assistants) should be able to prescribe medical marijuana.	.352	<b>.614</b>	.078	-.172
In my opinion, I feel pharmacists should be involved in the dispensing process for medical marijuana.	-.060	<b>.067</b>	.003	-.131
I feel that marijuana is safe when used responsibly for medical use.	.502	<b>.652</b>	.128	.001
I feel medical marijuana should be available for use in children.	<b>.604</b>	.403	.164	-.039
I feel medical marijuana is safe to use in pregnancy and lactation.	<b>.554</b>	.297	-.113	.259
I feel that marijuana can be detrimental to one's health for medical use.	-.295	-.722	<b>.088</b>	.064
I feel that medical marijuana is often abused.	-.711	-.038	-.238	<b>.378</b>
I feel that legalizing medical marijuana would cause crimes rates to increase.	-.597	-.360	-.395	<b>.094</b>
I feel that legalizing medical marijuana would cause more people to use marijuana in non-medical ways.	-.560	-.331	-.301	<b>.320</b>
I consider myself knowledgeable on the subject of medical marijuana.	.041	.045	<b>.859</b>	-.016
I understand the difference between delta-9 tetrahydrocannabinol (THC) and cannabidiol (CBD).	.375	-.020	<b>.656</b>	.140
I feel comfortable answering questions from my patients about the efficacy of medical marijuana.	.027	-.091	<b>.882</b>	-.212

Table 5. Survey Item Subscale Loading

I feel comfortable answering questions from my patients about drug interactions with medical marijuana.	-.030	.142	<b>.800</b>	-.233
I feel that medical marijuana is safe to use with prescription medications.	.289	.172	<b>.554</b>	.196
I feel that medical marijuana is safe to use with non-prescription medications.	.102	.361	<b>.558</b>	.232
I feel that medical marijuana has been adequately studied by scientists.	.094	<b>.629</b>	.177	-.148
I feel that the majority of people who support the legalization of medical marijuana are drug abusers.	-.745	-.313	<b>.094</b>	.077
If I had to make a decision today about legalization of medical marijuana, I would be in favor of doctor prescribed medical marijuana.	.400	<b>.825</b>	.065	-.042
I feel that our government has adequate resources to regulate the use of medical marijuana.	<b>.702</b>	.152	.041	.242
In my opinion, marijuana should be legalized for the general population.	<b>.712</b>	.217	.229	-.102
I feel that marijuana is a gateway drug.	-.643	-.339	-.016	<b>.236</b>
I feel that marijuana is safe when used responsibly for recreational use.	<b>.691</b>	.241	.239	-.103

Table 5. Survey Item Subscale Loading

I feel that recreational use of marijuana can be detrimental to one's health.	-.459	-.305	-.192	<b>.240</b>
I feel that legalizing marijuana for any use would cause crime rates to increase.	-.714	-.363	-.245	<b>.162</b>
I feel marijuana has fewer negative health effects than alcohol.	<b>.686</b>	.452	-.068	-.229
I feel users can become addicted to marijuana.	-.497	-.136	-.097	<b>.585</b>
I feel marijuana has fewer negative health effects than tobacco.	<b>.636</b>	.397	.070	.003
I feel marijuana has fewer negative health effects than prescription opiate medications.	<b>.526</b>	.193	.013	-.230
I feel marijuana has fewer negative health effects than prescription medications.	.154	<b>.404</b>	.168	-.220
I feel marijuana can impair one's ability to drive.	-.058	-.183	-.065	<b>.873</b>

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.<sup>a</sup>

## **Mean Differences**

Attitude and perceptions of MM was measured in the survey using 31 Likert-scale questions on a scale of 1-5. Independent samples t-tests were conducted to examine mean differences among healthcare workers based on gender and occupation. There were no significant differences between gender or occupation of healthcare workers and students based on attitude and perceptions of MM. See Table 6 for comparison by Gender and Table 7 for comparison by Student vs Professional.

Table 6. Comparison of Attitude and Perceptions of MM by Gender

Survey Item	Mean	Male	Female	p value
In my opinion, marijuana should be legalize for medicinal uses.	3.94	4.00	3.93	.839
In my opinion, all clinicians with prescribing rights (e.g. advanced nurse practitioners, physician assistants) should be able to prescribe medical marijuana.	3.63	3.50	3.66	.712
In my opinion, I feel pharmacists should be involved in the dispensing process for medical marijuana.	3.69	3.90	3.63	.442
I feel that marijuana is safe when used responsibly for medical use.	3.90	4.00	3.88	.712
I feel medical marijuana should be available for use in children.	2.84	3.00	2.80	.675
I feel medical marijuana is safe to use in pregnancy and lactation.	2.02	2.50	1.90	.107
I feel that marijuana can be detrimental to one's health for medical use.	2.84	2.90	2.83	.838
I feel that medical marijuana is often abused.	3.46	3.60	3.43	.680
I feel that legalizing medical marijuana would cause crimes rates to increase.	2.32	1.90	2.42	.088
I feel that legalizing medical marijuana would cause more people to use marijuana in non-medical ways.	3.31	3.60	3.23	.239
I consider myself knowledgeable on the subject of medical marijuana.	2.86	2.80	2.88	.829
I understand the difference between delta-9 tetrahydrocannabinol (THC) and cannabidiol (CBD).	3.66	3.70	3.65	.909
I feel comfortable answering questions from my patients about the efficacy of medical marijuana.	2.62	2.50	2.65	.700
I feel comfortable answering questions from my patients about drug interactions with medical marijuana.	2.32	2.30	2.33	.946
I feel that medical marijuana is safe to use with prescription medications.	3.08	3.20	3.05	.591
I feel that medical marijuana is safe to use with non-prescription medications.	3.12	3.20	3.10	.718



Table 6. Comparison of Attitude and Perceptions of MM by Gender

I feel that medical marijuana has been adequately studied by scientists.	2.73	2.70	2.74	.912
I feel that the majority of people who support the legalization of medical marijuana are drug abusers.	2.12	1.80	2.21	.273
If I had to make a decision today about legalization of medical marijuana, I would be in favor of doctor prescribed medical marijuana.	3.90	4.10	3.85	.507
I feel that our government has adequate resources to regulate the use of medical marijuana.	3.18	3.80	3.03	.098
In my opinion, marijuana should be legalized for the general population.	2.96	3.40	2.85	.298
I feel that marijuana is a gateway drug.	2.86	2.20	3.03	.093
I feel that marijuana is safe when used responsibly for recreational use.	2.88	3.20	2.79	.423
I feel that recreational use of marijuana can be detrimental to one's health.	3.39	3.60	3.33	.519
I feel that legalizing marijuana for any use would cause crime rates to increase.	2.29	1.80	2.41	.112
I feel marijuana has fewer negative health effects than alcohol.	3.81	4.10	3.74	.352
I feel users can become addicted to marijuana.	3.77	3.80	3.76	.916
I feel marijuana has fewer negative health effects than tobacco.	3.94	4.20	3.87	.297
I feel marijuana has fewer negative health effects than prescription opiate medications.	4.13	4.20	4.11	.748
I feel marijuana has fewer negative health effects than prescription medications.	3.54	3.50	3.55	.877
I feel marijuana can impair one's ability to drive.	4.23	4.40	4.18	.338

Table 7. Attitudes Knowledge and Perceptions of Marijuana by Student vs Professional

Survey Item	Mean	Student	Professional	p value
In my opinion, marijuana should be legalized for medicinal uses.	3.94	4.00	3.90	.742
In my opinion, all clinicians with prescribing rights (e.g. advanced nurse practitioners, physician assistants) should be able to prescribe medical marijuana.	3.63	3.50	3.50	.548
In my opinion, I feel pharmacists should be involved in the dispensing process for medical marijuana.	3.69	3.50	3.81	.275
I feel that marijuana is safe when used responsibly for medical use.	3.90	3.85	3.94	.750
I feel medical marijuana should be available for use in children.	2.84	2.47	3.06	.129
I feel medical marijuana is safe to use in pregnancy and lactation.	2.02	1.95	2.06	.707
I feel that marijuana can be detrimental to one's health for medical use.	2.84	2.75	2.90	.586
I feel that medical marijuana is often abused.	3.46	3.80	3.23	.097
I feel that legalizing medical marijuana would cause crimes rates to increase.	2.32	2.15	2.43	.368
I feel that legalizing medical marijuana would cause more people to use marijuana in non-medical ways.	3.31	3.30	3.31	.977
I consider myself knowledgeable on the subject of medical marijuana.	2.86	3.00	2.77	.410
I understand the difference between delta-9 tetrahydrocannabinol (THC) and cannabidiol (CBD).	3.66	3.90	3.50	.261

Table 7. Attitudes Knowledge and Perceptions of Marijuana by Student vs Professional

I feel comfortable answering questions from my patients about the efficacy of medical marijuana.	2.62	2.80	2.50	.344
I feel comfortable answering questions from my patients about drug interactions with medical marijuana.	2.32	2.35	2.30	.855
I feel that medical marijuana is safe to use with prescription medications.	3.08	2.95	3.17	.340
I feel that medical marijuana is safe to use with non-prescription medications.	3.12	3.20	3.07	.556
I feel that medical marijuana has been adequately studied by scientists.	2.73	2.75	2.72	.936
I feel that the majority of people who support the legalization of medical marijuana are drug abusers.	2.12	2.30	2.00	.323
If I had to make a decision today about legalization of medical marijuana, I would be in favor of doctor prescribed medical marijuana.	3.90	3.80	3.97	.598
I feel that our government has adequate resources to regulate the use of medical marijuana.	3.18	3.20	3.17	.943
In my opinion, marijuana should be legalized for the general population.	2.96	2.80	3.07	.539
I feel that marijuana is a gateway drug.	2.86	2.95	2.79	.717
I feel that marijuana is safe when used responsibly for recreational use.	2.88	2.65	3.03	.353
I feel that recreational use of marijuana can be detrimental to one's health.	3.39	3.50	3.31	.576
I feel that legalizing marijuana for any use would cause crime rates to increase.	2.29	2.20	2.34	.649
I feel marijuana has fewer negative health effects than alcohol.	3.81	3.68	3.90	.553

Table 7. Attitudes Knowledge and Perceptions of Marijuana by Student vs Professional

I feel users can become addicted to marijuana.	3.77	3.84	3.72	.686
I feel marijuana has fewer negative health effects than tobacco.	3.94	4.05	3.86	.472
I feel marijuana has fewer negative health effects than prescription opiate medications.	4.13	4.00	4.21	.396
I feel marijuana has fewer negative health effects than prescription medications.	3.54	3.68	3.45	.403
I feel marijuana can impair one's ability to drive.	4.23	4.26	4.21	.765

A one-way ANOVA was performed to compare attitude and perception of medical marijuana based on class of healthcare worker. There were statistically significant differences between groups on questions 15 (“I feel that medical marijuana is safe to use with prescription medications”) ( $F(6,43) = 3.073$ ,  $p = .014$ ) and question 17 (“I feel that medical marijuana has been adequately studied by scientists”) ( $F(5,43) = 2.478$ ,  $p = .047$ ). A Tukey post-hoc test showed the significance to occur between Nurses ( $M = 3.29$ ) & NPs/CRNA ( $M = 2.25$ ) for question 15; and Nurses ( $M = 3.07$ ), NP/CRNA ( $M = 1.67$ ), and PA/MD ( $M = 1.83$ ) for question 17. Post hoc analysis based on occupation are listed in Table 8.

Table 8. Post Hoc Based-on Occupation

	Nurse	PA/MD	NP/CRNA	Student	Other
I feel that medical marijuana is safe to use with prescription medications.	3.29*	3.17	2.25*	2.95	3.50
I feel that medical marijuana has been adequately studied by scientists.	3.07*	1.83*	1.67*	2.75	3.33

\* indicates significance at  $<.05$  level

## DISCUSSION

The purpose of this study was to assess current perceptions and knowledge of MMLs among Missouri healthcare workers and students. Based on the mean response comparison results, there is a strong need for more MM education. Of students that responded, 5% reported that MM education was included in school. Among participants 22.6% correctly answered how many states allow MM. This shows evidence of more education on MMLs is needed among those in the healthcare industry. While 83.3% felt MM should be approved in all states. This is consistent with Moeller and colleagues (2020) who indicated 91% of pharmacy students felt MM should be legalized nationwide.

Since this survey had not previously undergone psychometric analysis (Moeller & Woods, 2015; Moeller et al., 2020), the first research question was to assess the survey for reliability and validity. This resulted in 4 stronger subscales that were identified within the survey. Each subscale addressed specific subcategories of MMLs which were named by the researcher as: safety, awareness, advocacy, and misuse. This shows the survey as more reliable when broken down into 7 or 8-item subscales. Results highlighted that there is a need for a better scale with further validated results among healthcare and other populations where MMLs will have an impact.

There were no significant differences in knowledge and perceptions of MMLs among healthcare students. However, students and professionals tended to be neutral about their knowledge of MM when compared with student scores from 2015 (present study mean 3.00 and 2.77 respectively, vs. 2.3) (Moeller & Woods, 2015). This may show current professionals are slightly less comfortable with their knowledge when compared with students. While previous

literature has pointed out a knowledge gap among students in MM and a lack of education (Moeller et al., 2020).

Based on previous research, the researcher hypothesized a difference in current knowledge and perception of Missouri MMLs between class and gender of healthcare workers since policy adoption (Szaflarski et al., 2020). Two scale anchors showed statistically significant difference among responses based on occupation. Those in the NP/CRNA classification disagreed with whether MM is safe with prescription medications, while Nurses were neutral. Nurses again were neutral while NP/CRNA and PA/MD disagreed with whether MM has been adequately studied by researchers. However, these differences fall on a 5 point Likert-scale and the mean responses correlate to disagreement or neutrality which creates ambiguity in the interpretation of the results. There was more disagreement from those with more education in healthcare (NP/CRNA, PA/MD vs Nurses). Therefore, there was a significant difference in attitudes and perceptions among education levels of occupation among those in the healthcare field in the responses.

The researcher thinks health education on MMLs is specifically needed for healthcare workers in Missouri. This study showed a lack of prior education on MM and that majority of participants could not identify how many states have MMLs. These policies will cover important details for patients like QCs, possession and cultivation limits, and further details necessary to legally use MM. So, education that could provide information on how to identify and communicate the potential benefits/risks of MM to patients could help mitigate unsafe practices such as self-treatment (Sarvet et al., 2018). Also, education should include CBD-based therapies without psychoactive compounds that are effective for specific conditions.

A majority of students indicated a favorable attitude to MM, while being less informed on MMLs. As an increasing number of states in the U.S continue with similar policies, public health education on MMLs should be administered to those in health professional schools to create a better understanding for future healthcare workers (Moeller et al., 2020). Further, data that is reliable and valid could provide a current understanding of perceptions on Missouri policy. Mixed policies among state and federal agencies leave the legal landscape of MM difficult for patients to understand. This will add to current research of MM and be utilized to help clarify how policy impacts the healthcare industry within the state of Missouri.

### **Limitations**

There were a few key limitations in the present study. One limitation to this study was the sample size recruited from the healthcare industry in Missouri. The small sample size reduced the statistical power of the data. This was largely due in part to difficulties with recruitment of the sample population of healthcare workers and students to participate in the survey. Participants for this study were not randomly selected as they were currently employed or students in the healthcare industry. This restricted the sampling to a specific occupation or focus of study. Due to subject matter and social desirability bias, there may be limits to the amount of honesty in responses. By studying local healthcare workers, there is limited generalizability to a larger population. Due to variance in policy, there are limitations on the effect local MMLs will have on other locations.



## **Future Directions**

Future studies should continue to present validity data for measures of knowledge and perceptions of MMLs among healthcare workers and students. This could help explain the impact of MMLs on perceptions among patients and providers. Also, with a larger sample size, the data could have better represented those students and professionals in healthcare within Missouri.

In Missouri, proper health education could provide ways to address gaps among healthcare workers on MML knowledge including: QCs, dosing, legality, and other topics. Future research should include the state policies and a broader definition of healthcare worker to better understand how MMLs affect knowledge and perceptions among healthcare workers. This is to get a better understanding of what state's include in their MMLs in the course of future research.

## **Conclusions**

Healthcare workers and students are in favor of MMLs in the state of Missouri. However, responses show inconsistent knowledge of MMLs and a small percent have received education on MM. This population within the state of Missouri is in direct contact with patients and should be properly educated on the subject of MM and MMLs. This should include safe alternative treatments such as CBD-based therapies. Missouri's healthcare industry should stay informed on treatments that are available to its people and provide all the necessary information about such treatment.

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## **APPENDIX A: Measures**

### **Healthcare Workers Perceptions of MM Survey**

#### **Healthcare Workers' Current Knowledge and Perceptions of Medical Marijuana Laws**

Investigators: Cole Stomp, Sara Powell, Ph.D., Melinda Novik, Ph.D., Stacy Goddard, D.H.Ed.

You are being asked to participate in a research survey on healthcare workers' current knowledge and perceptions of medical marijuana laws in the state of Missouri. You will be asked questions about your knowledge on cannabis, cannabis products, and cannabis-based therapies: including medical marijuana and cannabis regulations. Participants for this research need to be age 18 or older, and a current healthcare worker or student in a healthcare field. There are no other requirements.

You will be asked to answer a number of survey questions regarding your current knowledge and perceptions on the subject matter. This survey will be taken online, should take less than 20 minutes to complete, and are completely anonymous.

There is no compensation for participation, but this research is designed to help advance the current knowledge and perceptions of medical marijuana and medical marijuana laws. There are no direct benefits to the participant in this study.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer a question or stop the survey at any time for any reason.

If you have questions about this research study, you may contact:

Cole Stomp, Stomp321@live.missouristate.edu  
Sara Powell, SaraPowell@MissouriState.edu  
Melinda Novik, MelindaNovik@MissouriState.edu  
Stacy Goddard, Sgoddard@MissouriState.edu

**By continuing to the questionnaire, I acknowledge that I am at least 18 years old, have read the above information, and agree to participate.**

#### **Section 1: Demographics**

1. What is your age?
  - a. 18-24 years old
  - b. 25-34 years old
  - c. 35-44 years old
  - d. 45-54 years old
  - e. 55-64 years old
  - f. 65-69 years old
  - g. 70-74 years old
  - h. 75-79 years old

- i. 80-84 years old
  - j. 85-89 years old
  - k. 90-94 years old
  - l. 95-99 years old
  - m. Over 99 years old
2. To which gender identity do you most identify?
- a. Male
  - b. Female
  - c. Transgender Female
  - d. Transgender Male
  - e. Gender Variant/Non-Conforming
  - f. Not Listed: \_\_\_\_\_
  - g. Prefer not to answer
3. How do you describe your race? (select all that apply)
- a. American Indian or Alaska Native
  - b. Asian
  - c. Black or African American
  - d. Hispanic or Latino/a/x
  - e. Native Hawaiian or Other Pacific Islander
  - f. White
  - g. Unknown
  - h. Other/Prefer to Self-Describe: \_\_\_\_\_
  - i. Prefer not to answer
4. What is your occupation?
- a. Medical Doctor (please specify discipline) \_\_\_\_\_
  - b. Nurse practitioner
  - c. Nurse
  - d. Pharmacist
  - e. Physician Assistant
  - f. Student or resident (please specify program) \_\_\_\_\_
  - g. Other (please specify): \_\_\_\_\_
5. What is your professional tenure?
- a. Resident/trainee/student
  - b. < 5 years
  - c. 6-10 years
  - d. 11-20 years
  - e. 21+ years
6. What is your work setting?
- a. Community hospital
  - b. Academic hospital
  - c. Private practice
  - d. Student, in clinicals or rotations
  - e. Other (please describe): \_\_\_\_\_
7. Do you have a family history of substance abuse?
- a. yes
  - b. no

8. Do you personally have a history of substance abuse?
  - a. yes
  - b. no
9. Have you ever used any form of marijuana (medical or non-medical)?
  - a. yes
  - b. no
10. Have you known anyone to use marijuana for a medical condition?
  - a. yes
  - b. no
11. During your education or training, have you received any specific education about medical marijuana?
  - a. yes
  - b. no
12. (show if STUDENT is selected) Is your school a public or private institution?
  - a. Public
  - b. Private
13. (show if STUDENT is selected) Does your school include in-depth discussion of medical marijuana in the core curriculum like other drug classes that you are taught?
  - a. yes
  - b. no
14. Do you feel that professors should include information about medical marijuana in your classes?
  - a. yes
  - b. no
15. Is medical marijuana approved for use in the state where you are located?
  - a. yes
  - b. no
  - c. I don't know
16. Do you feel that all states should approve the use of medical marijuana?
  - a. yes
  - b. no
17. Do you think marijuana should be legalized for recreational use?
  - a. yes
  - b. no
18. Do you feel the main reason marijuana should be legalized for recreational use is to help increase tax revenue? (skip if no to question 12)
  - a. yes
  - b. no
19. How many states allow the use of medical marijuana for authorized indications?
  - a. less than 10
  - b. 10-20
  - c. 21-30
  - d. 31-40
  - e. 41-50
20. How many states allow the use of recreational marijuana?
  - a. less than 10



- b. 10-20
- c. 21-30
- d. 31-40
- e. 41-50

21. Please answer the following based on your experiences with medical marijuana in healthcare practice (select all that apply):

- a. I have had patients inquire about using medical marijuana as a treatment
- b. I have prescribed medical marijuana
- c. I have suggested medical marijuana as a treatment option
- d. I do not feel comfortable talking to patients about medical marijuana
- e. I do not feel comfortable prescribing medical marijuana
- f. Other: \_\_\_\_\_

22. (If option A is selected from above): How many of your patients have requested medical marijuana? \_\_\_\_\_

23. How close do you live to a medical marijuana dispensary?

- a. Less than 5 miles
- b. 6-10 miles
- c. 11-15 miles
- d. 16-20 miles
- e. greater than 20 miles
- f. I do not know

24. What is your current workplace policy regarding the use of cannabis-based therapies?

- a. "Don't ask, don't tell"
- b. Nursing or medical techs must administer patient-provided product
- c. Pharmacy must administer patient-provided product
- d. Patient must administer own supply
- e. Not allowed
- f. Other (please specify): \_\_\_\_\_
- g. I do not know.

25. What is your current zip code? \_\_\_\_\_

## Section 2: Attitudes and Perceptions of MM for Healthcare Students (Moeller et al., 2020)

Please indicate how strongly you agree or disagree with each of the following statements using the following scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

	Strongly Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly Agree (5)
In my opinion, marijuana should be legalized for medicinal uses. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my opinion, all clinicians with prescribing rights (e.g. advanced nurse practitioners, physician assistants) should be able to prescribe medical marijuana. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my opinion, I feel pharmacists should be involved in the dispensing process for medical marijuana. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that marijuana is safe when used responsibly for medical use. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel medical marijuana should be available for use in children. (5)					
I feel medical marijuana is safe to use in pregnancy and lactation. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that marijuana can be detrimental to one's health for medical use. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that medical marijuana is often abused. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that legalizing medical marijuana would cause crimes rates to increase. (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that legalizing medical marijuana would cause more people to use marijuana in non-medical ways. (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider myself knowledgeable on the subject of medical marijuana. (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand the difference between delta-9 tetrahydrocannabinol (THC) and cannabidiol (CBD). (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable answering questions from my patients about the efficacy of medical marijuana. (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable answering questions from my patients about drug interactions with medical marijuana. (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	<b>Strongly Disagree (1)</b>	<b>Disagree (2)</b>	<b>Neither agree nor disagree (3)</b>	<b>Agree (4)</b>	<b>Strongly Agree (5)</b>
I feel that medical marijuana is safe to use with prescription medications. (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that medical marijuana is safe to use with non-prescription medications. (16)					
I feel that medical marijuana has been adequately studied by scientists. (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that the majority of people who support the legalization of medical marijuana are drug abusers. (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I had to make a decision today about legalization of medical marijuana, I would be in favor of doctor prescribed medical marijuana. (19)					
I feel that our government has adequate resources to regulate the use of medical marijuana. (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my opinion, marijuana should be legalized for the general population. (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that marijuana is a gateway drug. (22)	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that marijuana is safe when used responsibly for recreational use. (23)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that recreational use of marijuana can be detrimental to one's health. (24)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that legalizing marijuana for any use would cause crime rates to increase. (25)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel marijuana has fewer negative health effects than alcohol. (26)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel users can become addicted to marijuana. (27)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel marijuana has fewer negative health effects than tobacco. (28)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel marijuana has fewer negative health effects than prescription opiate medications. (29)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel marijuana has fewer negative health effects than prescription medications. (30)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel marijuana can impair one's ability to drive. (31)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## APPENDIX B: IRB Approval



**To:**  
Sara Powell  
Kinesiology

**Date:** Feb 4, 2021 9:43:48 AM CST

**RE:** Notice of IRB Exemption

**Study #:** IRB-FY2021-420

**Study Title:** Healthcare Workers' Current Knowledge and Perceptions of Medical Marijuana Laws

This submission has been reviewed by the Missouri State University Institutional Review Board (IRB) and was determined to be exempt from further review. However, any changes to any aspect of this study must be submitted, as a modification to the study, for IRB review as the changes may change this Exempt determination. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

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This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

**Researchers Associated with this Project:**

**PI:** Sara Powell

**Co-PI:**

**Primary Contact:** Cole Stomp

**Other Investigators:** Melinda Novik, Stacy Goddard, Cole Stomp