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Philadelphia College of Osteopathic Medicine
School of Professional and Applied Psychology
Department of Clinical Psychology

EXAMINING PHYSICIANS' ATTITUDES AND KNOWLEDGE REGARDING
MEDICAL MARIJUANA

By Philip Kaplan

Submitted in Partial Fulfillment of the Requirements for the Degree of
Doctor of Psychology

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ABSTRACT

Marijuana is one of the most commonly used illicit substances in the U.S. and its rapid implementation as a form of treatment has sparked significant national attention and debate among clinicians. In the United States, medical marijuana (MM) may be recommended as a form of treatment by certified physicians. The purpose of this study was to examine licensed physicians' support for recommending MM for various health conditions, their perceived knowledge regarding its efficacy as treatment, and their attitudes toward MM. This study employed a correlational design utilizing a self-administered, online survey (PCOM REDCap) to collect quantitative information from licensed and actively practicing physicians in the U.S. (N=24). The survey link generated by REDCap was posted to the private PCOM group page and permission was obtained to post on other physician-focused Facebook pages and listservs. The study also recruited physician-level using ResearchMatch.org. Two 5-point Likert-type scales had been developed to measure the degree to which participants would support recommending MM to treat numerous health conditions and to identify the perceived strength of empirical support for its treatment of each condition. Participants completed a 1 item 5-point Likert-type Provider Attitudes and Beliefs Regarding Cannabis scale. It was hypothesized that physicians' support for recommending MM would be significantly and positively correlated with their perceptions of the strength of its empirical evidence and that physicians' support for recommending MM would be significantly and positively correlated with their attitudes towards MM. Descriptive statistics were used to characterize the sample and examine specific attitudes and perceptions regarding its use. Findings from this study may offer additional insight on physicians' varying attitudes and support for MM.

CHAPTER 1: INTRODUCTION

Statement of the Problem

Cannabis is the most commonly abused illicit substance worldwide, with an estimated 147 million users (approximately 2.5% of the entire world population). The United States is the number-one consumer of cannabis in the world (22.2 million Americans aged 12 years and older reported use), and it is the third most commonly used substance in the United States after alcohol and nicotine (National Association of Social Workers, 2017; National Institute of Drug Abuse, 2017; World Health Organization, 2016). Over recent years, cannabis use and its medical efficacy have garnered increasing national support across the United States, with 36 states now approving it for medical purposes, 32 states decriminalizing it, and 17 states fully legalizing its use (Map of Marijuana Legality by State, 2021). Information pulled from ballot measures, as well as from public opinion polls, has revealed that approximately 60% of Americans support recreational use of cannabis, and 81% support its implementation as a form of medicine even though the federal government still recognizes it as a Schedule I substance (i.e., high propensity for abuse, no medical benefits; Bridgeman & Abazia, 2017; Quinnipiac University, 2016; & Swift, 2016). Some other substances that fit the criteria of a Schedule I category are MDMA (ecstasy), LSD, and heroin (Nutt et al., 2013).

In the United States, medical marijuana (MM) may be recommended by certified physicians as a form of treatment for at least 23 health conditions, yet literature is limited regarding physicians' attitudes regarding its use or knowledge about its efficacy (Restore Integrative Wellness Center, 2018; Rubin, 2017). Cannabis's rapid implementation as a form of treatment has sparked significant national attention and debate among clinicians,

and data are limited regarding physicians' conceptualizations of cannabis as a form of effective medication (National Institute of Drug Abuse, 2017; Rubin, 2017).

Definition and Purpose of the Study

MM is defined as marijuana that may be recommended by certified physicians as a form of treatment (Restore Integrative Wellness Center, 2018; Rubin, 2017). The purpose of this study was to develop more insight regarding how physicians in the United States have come to conceptualize cannabis as a form of medicine to treat numerous health conditions. Specifically, this study examined the level of support physicians have for the use of MM as a form of treatment and identified whether perceptions of empirical support for MM influenced their attitudes and beliefs toward MM. As marijuana is one of the most commonly misused illicit substances in the United States, physicians' current conceptualizations regarding cannabis for medical purposes are important to understand.

Research Question and Hypotheses

The research question for this study was as follows: How are physicians' perceptions of existing evidence, attitudes, and levels of support for MM associated with one another?

Hypothesis 1

H₁: Physicians' level of support for MM will be significantly and positively associated with their perceptions of the strength of its empirical evidence.

Rationale for H₁: Prior research has provided some indication that physicians are more likely to recommend MM for specific health conditions they believe to be supported by empirical evidence (Jacobs et al., 2019; Kondrad & Reid, 2013). In addition, other research has indicated that many clinicians may have adopted a more

apprehensive attitude toward MM as a result of limited education and training in this area (Rubin, 2017).

Hypothesis 2

H₂: Physicians' level of support for MM will be significantly and positively associated with their attitudes toward marijuana (medical or not).

Rationale for H₂: Previous research has found that physicians who had recommended MM in the past possessed more favorable attitudes on its efficacy as a form of treatment and were less critical of its risks than physicians who had not recommended cannabis (Kondrad & Reid, 2013). Observing the attitudes of U.S. physicians regarding MM and how closely they correlate to their belief that it is a substance that should be recommended for certain conditions would be interesting.

Hypothesis 3

H₃: Physicians' perceptions of evidence will be significantly and positively correlated with their attitudes toward MM.

Rationale for H₃: Physicians have shown in prior research that their preference to either recommend or not recommend MM was most strongly influenced by literature/empirical evidence when compared to other media, such as news media, personal experiences with patients, and other physicians' views. (Kondrad & Reid, 2013). This helps reinforce the idea that physicians' conceptualizations and attitudes toward MM may be strongly influenced by research as well. Physicians have shown in previous research that their preference to either recommend or not recommend MM was most strongly influenced by literature/empirical evidence when compared to other media (e.g., news, experiences with patients, other physicians; Kondrad & Reid, 2013). This helps

reinforce the idea that physicians' conceptualizations and attitudes toward MM may be strongly influenced by research as well.

CHAPTER 2: LITERATURE REVIEW

Brief History of Marijuana

Medical marijuana (MM) has an extensive history of use by a range of different cultures. Some experts believe that marijuana was initially used as herbal medication in central Asia more than 10,000 years ago, spread throughout Europe, transitioned into use by African natives, and eventually was introduced into the United States through colonization (Pisanti & Bifulco, 2019). Early American colonists incorporated the use of cannabis (hemp) for grain such as clothing, paper, sails, rope, and consumption which dated back to the Neolithic Age in Japan and China (Barber, 1992; Stafford & Bigwood, 1992). Early legislative reforms in America dating back to the 1600s were more supportive of cannabis because of these numerous advantages in addition to it being produced quickly and easily cultivated compared to other plants (Johnson, 2017). However, between 1906-1938, the United States began reinforcing laws prohibiting the use of cannabis, which was categorized as a poison in many states during this time period. The United States began promoting misleading and inaccurate effects of marijuana throughout the 1930s, and this led to more strict legal repercussions throughout the 1950s. During this time period, marijuana use was associated with negative social connotations and violent behaviors within various minority groups (i.e., Mexican, African, and Japanese American; Warf, 2014).

MM has become increasingly more accessible for medical purposes throughout the United States ever since the Compassionate Use Act was passed in California in 1996 (Rojas, 1998). Over the past few years, more states have experienced policy reforms that approved MM for medical purposes, decriminalized MM, or completely legalized MM for

recreational use by adults. Such reforms have helped MM to receive approval for recommendation by physicians for certain health conditions in 36 of 50 states (Map of Marijuana Legality by State, 2021). However, according to the U.S. Drug Enforcement Agency's (DEA) Comprehensive Drug Abuse Prevention and Control Act of 1970, cannabis is currently regarded as a Schedule I controlled substance by the federal government. This places cannabis in the same category as heroin and cocaine and identifies it as a substance that is addictive with no clinical benefits (Bridgeman & Abazia, 2017; Quinnipiac University, 2016; Swift, 2016).

Why Marijuana Is Used

Patrick et al. (2011) found that individuals between 18-30 years old continued to use marijuana because it helped them relax and/or get high. Other research had found that frequency of smoking cannabis decreased with age. Previous research had found that among veterans, those who used cannabis for medical purposes were much more likely to meet the criteria for PTSD and had much more incentive to smoke cannabis in order to help them manage health-related conditions, such as stress/anxiety, pain, depression, and insomnia, as compared to veterans who smoked recreationally (Metrik et al., 2018). Additional research has found some patients who used marijuana for medical purposes perceived it as providing relief for a number of different symptoms associated with sleep, pain, and anxiety, although routes of administration did differ (Walsh et al., 2013).

Scope of Cannabis Use/Addiction

Cannabis is the most commonly abused illicit substance worldwide and the third most commonly used drug in the United States after alcohol and nicotine (National Institute of Drug Abuse, 2017; World Health Organization, 2016). Budney et al. (2019)

and the National Association of Social Workers (2017) reported that as many as 7% of Americans have identified themselves as habitual cannabis users and that more than one third have admitted to using it in the past. Additionally, according to epidemiological data, a range of anywhere between 10% 30% of users report symptoms consistent with cannabis use disorder (Budney et al., 2019). Approximately 147 million individuals consume cannabis annually, making up approximately 2.5% of the entire population of the world (World Health Organization, 2016). Prevalent use of cannabis has also transitioned into common use among American adolescents, 22.2 million of whom were 12 years old or older and reported regular consumption (Bridgeman & Abazia, 2017; Office of National Drug Control Policy, 2016; Substance Abuse and Mental Health Services Administration, 2016). In 2012, nearly 2 million people (or nearly 5% of the population) in California reported use of cannabis for medical reasons, but this did not take into account individuals who decided to use this substance recreationally (Haberstick et al., 2014). This led to increased concerns not only regarding the legal and ethical ramifications associated with its distribution, but also in regard to the degree to which this substance is efficacious in treating some health conditions (Bridgeman & Abazia, 2017).

Race, Gender, and Age

Additional research has found that young adults aged 20-24 years old are the most prevalent users of cannabis globally (Degenhardt et al. 2013; Russell et al., 2018). Carliner et al., (2017) had found that between 2002-2014, increased cannabis use was greater for men than for women. This gender gap in cannabis use was at its highest level among low-income men during the Great Recession from 2007-2014. Furthermore, other

research has suggested that African American individuals tend to use marijuana more frequently than individuals of other races/ethnicities (Pacek et al., 2012).

Routes of Administration

Cannabis is most commonly smoked, but vaporizers, dabbing, and edibles remain popular forms of use as well. Other routes of administration include patches, pills, tinctures, transdermal topicals (e.g., cannabis-infused lotions, balms, oils), intravenous routes (e.g., via syringe), and rectal routes (e.g., suppositories; Geshtakovska & Stefkov, 2016; Shiplo et al., 2016).

Smoking

Smoking cannabis (e.g., joint, blunt, spliff, water-pipe/bong) remains the most common route of administration among Americans. Previous and current cannabis users possessed a preference to smoking over other routes of administration, according to a national survey taken in 2014 (Schauer et al., 2016). Studies have shown that among middle- and high-school students and Baby Boomers, smoking was also the most common route of administration (Johnson et al., 2016; Murphy et al., 2015). When cannabis is smoked, THC and other chemicals enter the bloodstream through the lungs (Brady & Li, 2014). Typically, this can onset a brisk physiological response as some of these chemicals from the plant cross the blood-brain barrier. Users frequently report experiencing increased relaxation and other euphoric sensations that may include increased sensitivity to sensory stimuli (e.g., colors being more poignant or bright), shift in mood, altered sense of time perception, and/or increase in appetite. These processes may lessen when cannabis is consumed with food or beverages as a result of the digestive process. Cannabis may also be ingested orally as an attempt to achieve similar effects to

smoking, but this approach typically includes a delayed effect and may increase chances of overdose, as more THC may be introduced than the user may have initially intended. THC is the primary psychoactive ingredient in marijuana and achieves this effect on the brain by binding to one's CB1 receptors (Secci et al., 2019).

Some research has shown that increased exposure to THC increases glutamate levels in rats and has led some physicians to believe that THC binding with CB1 receptors helps release glutamate (Navarrete & Araque, 2008; Pistis et al., 2002). Some researchers also suspect that this process is possible because THC affects astrocytes, cells in the brain and spinal cord that assist with the functionality of the CB1 receptors, although the specifics as to how remain a topic of debate (Secci et al., 2019). Additionally, inconsistent findings between animal and human research have generated ambiguity regarding the significance of this process in terms of how THC affects and influences specific brain regions (Secci et al., 2019).

Overdosing on cannabis is possible if ingesting a product that is potent enough and may cause some individuals to experience more aversive effects, such as a sudden increase in anxiety, panic, and fear of either others and/or the environment they are in (Buckner et al., 2014; Hall & Solowij, 1998; Ramaekers et al., 2006). In other instances, individuals who ingested large amounts of cannabis experienced more severe side effects, including hallucinations, delusions, and acute psychosis, although such reactions were temporary (Hall & Degenhardt, 2009). Other research identified respiratory symptoms, such as coughing and wheezing; constriction of the airways in the lungs; and history of being linked with chronic bronchitis (Russell et al., 2018; Gates et

al., 2014). Individuals who managed to reduce their smoking or to quit have also demonstrated a decrease in respiratory dysfunction (Hancox et al., 2015).

Smoking cannabis has also been shown to be concurrent with smoking tobacco, and concurrent use of marijuana and tobacco has also been associated with worse health outcomes than those of individuals who smoked only cannabis. Some of these worse health outcomes included respiratory dysfunction, increased risk for cannabis use disorder, and increase in mental health symptoms (Agrawal et al., 2012; Ramo et al., 2012). Furthermore, individuals who smoke blunts (i.e., cannabis rolled into tobacco leaf paper) have been associated with an increased risk for cannabis use disorder and nicotine dependence compared to individuals who smoked marijuana but not blunts or who did not smoke (Fairman, 2015; Timberlake, 2009).

Vaporizers

One form of cannabis administration that has been increasing in popularity is vaporizers (e.g., vape pens, electronic cigarettes, vape mods). Through this method of use, cannabis is heated electronically and inhaled in the form of vapor. The availability of vape pens and similar devices has increased substantially, and they continue to grow in popularity in the United States (Russell et al., 2018). For instance, in a large online survey conducted in 2016 ($n = 2,910$) 61% of Americans identified themselves as lifetime users of cannabis vaporizers, and 37% reported current use in the past month. Vape pens (45%) were the most popular form of vaporizing cannabis, ahead of other forms of vaping, such as tabletops, portables, and e-cigarettes (Lee et al., 2016). In one study, participants reported that their top reasons for preferring vaporizers over other forms

of cannabis consumption was its convenience and discretion, permitting them to use in public locations (Jones et al., 2016).

One study found that vaporizers absorbed THC from cannabis more effectively than simply smoking cannabis. The vaporizer also did not significantly increase carbon monoxide (CO) levels if at all compared to smoking cannabis, which did increase CO levels. This indicates that participants who vaped were not exposed to “gaseous combustion toxins,” which are harmful. Participants also reported that they preferred vaping over smoking, suggesting that vaping is safer and “cleaner” than smoking marijuana as a result of how the THC is processed (Abrams et al., 2007). Additionally, some previous research has shown that participants who switched from smoking cannabis to vaping for 1 month yielded significant improvements in respiratory functioning (Earleywine & Van Dam, 2010; Van Dam & Earleywine, 2010). Additionally, in a large self-report survey ($n = 6,883$) participants who reported using vaporizers were significantly less likely to report respiratory issues than those who did not use vaporizers (Earleywine & Barnwell, 2007). Additionally, some research has shown that vaporizer use helped participants decrease or quit smoking cannabis, although the specific reasons as to why remain unclear (Etter, 2015; Gartner, 2015).

Edibles and Drinkables

Cannabis products may also be presented in the form of edibles (e.g., cannabis-infused brownies, drinks, candies), one of the more popular forms of consumption among Americans. In 2014 alone, Colorado produced \$700 million in medical and recreational sales of marijuana, of which edibles accounted for approximately 40% (Weiss, 2015). Some research has indicated that edibles tend to be more popular in states

where marijuana is legalized as compared to those in which it is not, are used more by women than men, and have a high rate of use among current cannabis users in Washington (of 1,687 current marijuana-using surveys, 78% reported edible consumption in the previous year; Borodovsky et al., 2016; Friese et al., 2016; Kilmer et al., 2013). Typically, after ingesting cannabis in an edible form, the psychoactive effects tend to be delayed, but may be unpredictable and excessive. Some products may possess more than 4 times the level of THC than is safe, possibly leading to severe anxiety attacks and serious psychoactive symptoms (MacCoun & Mello, 2015). Other reported side effects include drowsiness/lethargy, tachycardia, agitation/irritability, and confusion (Cao et al., 2016).

Cannabis edibles have grown quickly in popularity in such states as Colorado and Washington since recreational use has been legalized. This has also led to a steady increase in cannabis-related emergency room visits and U.S. poison control calls and has prompted four states (i.e., Alaska, Colorado, Oregon, and Washington) to require specified labels regarding dosage in order to try to decrease such occurrences (Gourdet et al., 2017).

Dabs

Dabs, or butane hash oil (BHO), is a wax-like substance created by extracting THC from a cannabis plant. It can reach THC concentrations levels of 70%-90%, whereas plant-based concentrations range between 3%-6%. As a result, dabs can lead to psychotic episodes and increase risk of injury (Keller et al., 2016). Typically, dabs are placed onto a piece of glass and heated with a blowtorch until they are vaporized and the individual can inhale the vapors in order to feel the psychoactive effects (Loflin &

Earleywine, 2014). Over the last few years, emergency admissions related to BHO-extraction injuries and burns have increased (Bell et al., 2015; Jensen et al., 2015). Additionally, regular dabbing increases the risk of developing cannabis use disorder as a result of increased tolerance and consistent increase in dosage (Loflin & Earleywine, 2014).

Other Routes of Administration

Other routes of administration include patches, pills, tinctures, oils, transdermal tropical, suppositories, and intravenous routes (i.e., syringes and rectal routes). Unfortunately, prevalence and outcome data regarding these routes of administration are limited within the academic literature. This is also the result of the rare use of these routes of administration among the general population (Russell et al., 2018).

Cannabinoid Receptors and Mechanism of Action

The two major primary components of marijuana are phytocannabinoids: THC and cannabidiol (CBD), both of which are cannabinoids. Cannabinoid refers to the active components produced by the different strains of marijuana, such as sativa and indica. Of these two primary components, THC is recognized as one of the primary cannabinoids responsible for generating the psychoactive effects of cannabis and is identified as the primary ingredient that helps to induce psychosis, cognitive delay, and panic attacks if misused. Some previous research has highlighted the fact that the concentration of THC has substantially increased over the past 24 years, increasing as much as anywhere between 15%-20% in some areas. Cannabis affects the endocannabinoid system (ECS), which is composed of cannabinoid receptors in the brain and within the immune system. The two primary receptors within the ECS are cannabinoid receptor type-1 (CB1) and

cannabinoid receptor type-2 (CB2). The CB1 and CB2 receptors have a greater concentration in the neocortex, basil ganglia, and hippocampus and possess a great influence over memories, appetite, and responses to stress function. Additionally, the ways one processes rewards and reinforcement are also influenced by the CB1 and CB2 receptors (Rong et al., 2017).

CBD is a naturally occurring cannabinoid in cannabis that acts as an antagonist at the CB1 receptor site and as an inverse agonist at CB2 receptors. It also prevents or slows down the degradation of anandamide (AEA), a naturally occurring neurotransmitter responsible for a wide array of functions, such as memory, motivation, and appetite, and has been shown to help with neural pruning and synaptic restructuring. In contrast, THC depletes AEA, and the rate at which AEA is diminished may mediate some of the psychoactive effects of THC (Rong et al., 2017; Wilkie et al., 2016). AEA is also responsible for the development of new nerve cells and can serve as a natural antianxiety agent and antidepressant. It does, however, break down quickly, but like marijuana, it binds effectively with the CB1 and CB2 receptors. When cannabis is ingested, it contains THC, a cannabinoid that resembles AEA, and is able to bind to the CB1 receptor. This binding process of cannabinoids to the receptors (especially CB1), triggers the psychoactive properties of the substances (Rodriguez de Fonseca, et al., 2004; Rong et al., 2017; Wilkie et al., 2016).

Legalization

Medical cannabis has become increasingly more accessible for medical purposes throughout the United States ever since the Compassionate Use Act was passed in California in 1996 (Carr & Schatman, 2019). During the past few years, more states

have enacted policy reforms that have approved MM for medical purposes, were decriminalized, or were completely legalized for recreational use by adults. Currently, 36 states have approved the use of medical cannabis, 32 states have decriminalized it, and 17 states have fully legalized its use (Map of Marijuana Legality by State, 2021). However, according to the U.S. DEA's Comprehensive Drug Abuse Prevention and Control Act of 1970, marijuana is currently regarded as a Schedule I controlled substance. Schedule I substances are considered to possess a high risk for abuse and lack any medical use. Some alternative examples of Schedule I drugs include heroin, cocaine, and narcotics (Koocher & Shortt, 2018). Some advocates for legalized cannabis use have expressed concern over the association of cannabis within a category of other substances that possess a much higher risk for more severe and detrimental health consequences (Fergusson et al., 2006; Levitan, 2015).

Furthermore, legislatively the federal government cannot impose its laws on cannabis in states where it has become legalized because Congress has passed such acts as the Consolidated Appropriations Act of 2018, which helps prevent the federal government from using its budget funds to override marijuana laws. However, there are some exceptions, mainly if the state and federal laws happen to conflict. In such a case, the federal law overrides the authority of the state, as is stated in the Supremacy Clause in the United States Constitution (Koocher & Shortt, 2018).

Medicalization, State of Research, Number of Ailments Found To Be Effective/Limitations

Some previous research has found that MM can be used as a form of efficacious treatment for certain conditions, including chronic pain, multiple sclerosis, nausea, side effects of chemotherapy, lack of appetite, and sleep disorders (Abrams, 2018; Belendiuk

et al., 2015). In regard to relief of side effects of chemotherapy, a study was conducted by Parker, et al. (2006) in which house musk shrews were exposed to contextual cues that were paired with lithium chloride (LiCl) injections and had been conditioned to vomit even when LiCl was not administered. The investigators found that exposure of CB1 and CB2 receptors to cannabinoids helped suppress the vomit response as opposed to pretreatment that included ondansetron. In a study that included 600 patients, Ben Amar (2006) reviewed the outcomes of 15 randomized clinical trials in which nabilone, a synthetic cannabinoid, was compared to either a placebo or other antiemetic medications. The results indicated that nabilone was much more effective as a form of treatment than prochlorperazine, domperidone, and alizapride, and patients expressed a stronger preference for nabilone when asked which medication they would like to use. However, variability and inconsistencies across the 15 clinical trials limited the generalizability of the results of this study.

Previous research also explored the use of MM to treat cancer-related neuropathic pain (Manzanares et al., 2006). Studies conducted by Fine and Rosenfeld (2013) found that cannabinoids had a similar concentration and distribution in the brain to those of opioid receptors, while research by Ibrahim et al. (2005) found indications that cannabinoids may possess anti-inflammatory characteristics by interacting with mast cell receptors. Additionally, published clinical trials have shown patients diagnosed with cancer recognized THC as a superior analgesic to placebo when administered at 15-20 mg and as more analgesic and sedating than codeine when administered at 10 mg. Some of the limitations of these trials include small sample sizes and dated information from more than 40 years ago (Noyes, Brunk, Baram, & Canter, 1975; Noyes et al., 1975).

More recent clinical trials included 360 randomized patients suffering from cancer and opioid-refractory pain who were administered nabiximol, a cannabis extract composed of THC and CBD. Nabiximol was administered at low, medium, and high doses and then compared to placebo. The trial found that at low and medium doses, patients recognized nabiximol's analgesic effects more than those of the placebo, but higher doses did not differ from the lower- and medium-dose results (Portenoy et al., 2012). In a trial conducted by Johnson et al. (2010), 177 patients suffering from cancer pain despite opioid use were exposed to a THC and CBD treatment, a THC only treatment, and a placebo. Participants in the combined CBD and THC group reported significant decrease in pain symptoms whereas the THC only treatment did not differ from the placebo. However, some of the limitations of such studies are reliance on self-report measures and/or small effect sizes. Additionally, no studies currently present cannabis or cannabinoids as first-line agents (Whiting et al., 2015; Wilkinson & D'Souza, 2014).

Furthermore, for some conditions such as PTSD, Crohn's disease, AIDS/HIV, and/or Alzheimer's disease, tests of the efficacy of marijuana use through clinically controlled, randomized trials is severely lacking in the literature. Instead, much of the research concerning such medical conditions and the medical impact cannabis has on them is testimonial. Additionally, the amount of marijuana that must be administered in order for it to achieve a medically efficacious effect is not specified, nor do some of the articles specify the mode of administration used to treat a specific symptom and/or condition. This makes finding an appropriate dose challenging, and clinicians must be

wary of other factors, such as tolerance, dependence, and withdrawal symptoms/effects if the patient chooses to discontinue.

Cannabis also contains more than 100 cannabinoids, terpenoids, and flavonoids, all of which may have different effects on different individuals. THC is the primary psychoactive ingredient, but others may be able to avert some of the negative side effects of THC. One should note that although a cannabis pill approved by the FDA does exist, most users seem to prefer to smoke as a way to control for euphoric sensations that may be more difficult to achieve through pill administration (Wilkinson & D'Souza 2014). Additional research has found that marijuana use may increase the risk for some individuals for developing acute psychosis, and it found that a structural shift in the brain of long-time users contributes to lower IQ over time (Wilkinson & D'Souza 2014).

Furthermore, a recent meta-analysis was conducted to examine the specific conditions for which MM was effective (Whiting et al., 2015). The review found MM to be effective for treating tic severity caused by Tourette syndrome, decreasing symptoms of chronic pain, and improving quality of sleep. Also, researchers found that cannabis may relieve symptoms of anxiety, but none of these studies featured individuals who suffered only from anxiety. MM was not found to be effective for treating symptoms of nausea and vomiting resulting from chemotherapy, increasing appetite stimulation in patients suffering from HIV/AIDS, improving symptoms of spasticity caused by multiple sclerosis or paraplegia, or improving symptoms of psychosis and glaucoma. Furthermore, no study examining the effects of MM met inclusion criteria for the treatment of depression. Additionally, a body of literature explores cannabis as a potential antitumor substance.

Older research, such as that conducted by Munson et al., 1975) found that THC administration decreased tumor growth in mice. More recent research (Bowles et al., 2012; Pisanti et al., 2009; Abrams & Guzman, 2015) found that cannabinoids may be used to decrease the rate at which tumors grow by decreasing cellular proliferation and increasing apoptosis within cancer cells. Other research found that when synthetic cannabinoids bind with the CB2 receptors, cell proliferation of cancer cells decreases and cancer metastasis may potentially decrease. This study was replicated with mice, and similar results were achieved (Qamri et al., 2009).

Attitudes/Acceptance Among Physicians and Doctoral/Medical Students

Despite the growing popularity and approval of cannabis use among Americans (recent polls have identified that 60% of Americans approved of recreational use of marijuana, and 80% supported MM), some physicians have reported mixed views in regard to whether they would feel comfortable prescribing cannabis for any medical reason (Mental Health Weekly, 2013). Other bodies of literature have touched upon the idea of the number of physicians who either felt as though they did not have enough research to guide their support for MM use or reported not undergoing enough educational training in regard to the potential benefits and/or drawbacks of its use, especially over an extended period of time (Rubin, 2017). Many physicians do not agree with medicalization of marijuana. Researchers (Charuvastra et al., 2005) found that of 960 surveyed physicians, 36% believed prescribed cannabis should be legalized, and 26% were neutral to the notion. The study also found that obstetricians-gynecologists and internal medicine physicians expressed that they were significantly more likely to support

its prescription as compared to physicians in other fields (e.g., family physicians, internists, psychiatrists, addiction specialists).

A study composed of 209 hospice health professionals found that the vast majority (90%) of the participants believed that cannabis should be legalized, reported ignoring patients' cannabis usage if it alleviated their symptoms (75%), and were supportive of family members obtaining small amounts for loved ones to use (70%), or of obtaining it from a pharmacy (88%). Non-physicians (i.e., nurses and social workers) generally agreed that cannabis possessed health benefits whereas physicians "somewhat agreed" to this notion. Respondents were divided regarding the branch of government that should be responsible for legalizing cannabis, and respondents older than 50 years were more likely to disagree with the idea that cannabis is addictive compared to younger participants (Uritsky et al., 2011). Furthermore, nearly half (47.8%) the sample reported being asked about cannabis use by either their patients or their family members.

Research conducted by Ziemianski et al. 2015) surveyed 426 physicians regarding their knowledge, experiences, attitudes, and barriers about MM. Physicians identified lowest level of knowledge regarding cannabis usage, dosing, and discrepancy between cannabinoid medications and other cannabis products. The vast majority of participants expressed a desire for further, more in depth education regarding these topics. A majority of Canadian physicians (79%) reported being approached by patients and/or family members regarding MM usage whereas 39% reported initiating the discussion themselves. About two thirds of the sample (65%) reported that one of the greatest barriers was concern about whether clients who requested MM under the pretense of

treatment would in reality be using it for recreational purposes. Canadian physicians also expressed possessing additional data regarding risks and benefits of cannabis use.

In regard to their attitudes, a majority believed that either specialized physicians (85%) or family physicians (74%) should be able to authorize cannabis usage for their patients, but they were divided when asked about whether nurses should have this same authority. Twenty-five percent of respondents believed that nurses should, but 60% did not agree. A majority did agree that other healthcare professionals should not be able to authorize cannabis use for patients, and 70% believed that with additional education they would be able to make better decisions regarding whether a client needed MM.

In another research study, 236 medical students participated in a survey about their attitudes toward cannabis. Approximately two thirds of the sample (64%) reported support for cannabis legalization, yet 77% and 68% reported a belief that marijuana had the potential to be harmful psychologically and physically, respectively. A minority of the sample (29%) stated they would recommend cannabis under current law, and this percentage increased to 45% if marijuana were legally available. Additionally, the vast majority of the sample (97%) believed more research should be conducted and that cannabis could play a role in treatment (Chan et al. 2017).

Research conducted by Kondrad and Reid (2013) found that the three most common conditions for which MM is recommended by family physicians is pain, nausea, and cancer. The research also showcased how family physicians relied most heavily on medical literature and personal experiences with a client as their primary sources of information regarding MM efficacy. Personal experiences with a client and medical literature were also the two most relied upon factors as to whether a physician

would decide to recommend or not recommend MM. Of the 520 family physicians who participated in the study, 46% did not support family physicians recommending MM as opposed to 19% who did. Most family physicians in this study were not convinced of MM's health benefits, but a majority (92%) believed future research should be conducted, and 81% believed recommenders should be trained.

Alternatively, in a poll conducted by Adler and Colbert (2013), of 1,446 physicians, 76% reported they would approve the use of cannabis for medical reasons. Respondents cited their support for MM out of a belief that they were responsible for helping to alleviate the suffering of their clients (Adler & Colbert, 2013). Some literature explores the varying degrees of support of MM from physicians in different specialties. One such study was conducted by Ebert et al. (2015) in which Israeli oncologists, pain specialists, psychiatrists, neurologists, and rehabilitation physicians all agreed that MM could be helpful for terminally ill patients, that additional education is required for physicians, that certified recommenders should be trained, that MM may have potential for therapeutic purposes, and that MM can be incorporated as a legitimate form of treatment and therapy. Pain physicians and oncologists disagreed with the other specialized physicians that MM could undermine mental health, but the majority (73%) agreed that patients should not obtain cannabis from growers and that some clients desire MM for recreational reasons (69%). Physicians were divided regarding cannabis legalization for recreational purposes. Of those surveyed, 54% objected, 22% supported cannabis legalization for recreational purposes, and 15% were neutral. Compared to some other research, there was some partial acceptance of MM among this sample of physicians.

In a study conducted by Ablin et al. (2016), a sample of 23 Israeli rheumatologists surveyed their attitudes regarding MM. Three quarters of the sample lacked knowledge regarding cannabinoid molecules and lacked the confidence to prescribe MM. Despite this lack of knowledge, a majority of participants expressed a belief that MM could be implemented in the future to treat rheumatic disease. Additionally, 82% of the sample reported a consideration to prescribe MM if conventional medication failed to treat a client's symptoms. The responders also identified concerns about recreational usage of prescribed MM, previous history of addiction with a client asking for a prescription, the potential for motor vehicle accidents, and interaction between cannabis and other medications.

Another study explored oncologists' attitudes toward MM. The study was composed of 237 participants, of whom only 30% felt confident and well informed enough to provide a MM recommendation. Although 80% of oncologists reported discussing MM with patients and their families, only 46% had ever provided a recommendation for it. Additionally, 65% of responders also reported the belief that they felt that MM was more effective in treating anorexia and cachexia compared to standard medication. Furthermore, oncologists practicing in the South (68%) were less likely to discuss MM as an option compared to oncologists practicing in the West (94%). Oncologists in the West (84%) were also more likely to recommend MM compared to oncologists in the South (34%) as well. Oncologists were also divided on whether MM was an effective analgesic. Only 34% viewed MM as more effective than standard medication, 32% believed it was less effective, and 33% stated they did not know. Of the oncologists surveyed, 64% believed MM was equally or more effective

than standard medication for treating cachexia, 48% for cancer, 45% for anxiety, 40% for general coping, and 35% for poor sleep. Most oncologists in the study did not view MM as more dangerous than opioids in terms of overdose death but did perceive it to place users at slightly higher risk for developing paranoia and confusion (Braun et al. 2018).

One should be aware of not only the number of physicians who may be in favor of or opposed to MM, but also the factors that may influence these decisions or perceptions. According to cognitive-behavioral theory, one's perceptions of the empirical evidence for or against a specific issue or phenomenon may significantly impact one's understanding and acceptance (Clark et al., 2000). As such, physicians' attitudes and support for MM may be linked to their perceptions of the empirical evidence in support of this novel treatment.

CHAPTER 3: METHOD

Design and Design Justification

This study employed a correlational design using a self-administered, online survey (i.e., PCOM REDCap) to collect quantitative and qualitative information from licensed and actively practicing physicians in the United States ($N = 24$). The specific variables studied were demographic information, level of support for medical marijuana (MM), perceptions of the strength of supporting research on MM, and attitudes toward MM. Twenty-three qualifying medical conditions were selected because they had received approval by the Pennsylvania Department of Health. This design was selected because it was a cost-effective way of gathering the desired information from a very specific population during a pandemic.

Participants

This study involved 24 physician participants. Eligible participants included physicians currently licensed in the United States (MD or DO) and who were currently practicing within the medical field. Physicians who were no longer in practice or worked solely in a teaching or research capacity were excluded. Potential participants were screened prior to starting the demographic questionnaire that was provided at the beginning of the survey.

Materials

The introduction to the survey link used to help recruit participants follows:

Introduction

Hello, my name is Philip Kaplan and I am a 5th year doctoral candidate for the clinical Psy. D program at Philadelphia College of Osteopathic Medicine under the supervision of Dr. David S. Festinger, my dissertation Chair. The goal of the study is to examine the relationship between physicians' knowledge, attitudes, and beliefs about

medical marijuana as an effective form of treatment for various health conditions in the state of PA. If you choose to participate, your responses, identity, and personal information will remain completely confidential.

You may participate if you:

- Are a licensed physician in the state of PA
- Actively practicing within the medical field

If interested, please click on the link to the survey below. If you have any questions please reach out to me at philipka@pcom.edu. Thank you for taking the time to read this!

Inclusion Criteria

To be included in the study, participants had to be licensed and actively practicing physicians (MD or MO).

Exclusion Criteria

This study did not feature any exclusion criteria if the inclusion criteria were met. Participants were informed of who was eligible to take part in the study before they pressed the link to the survey. Additionally, the first few survey questions inquired about the previously listed inclusion criteria to determine eligibility.

Recruitment

The survey link generated by REDCap was posted to the private PCOM Alumni Facebook group page, and permission was obtained to post on other physician-focused Facebook pages and listservs. The study recruited physician-level participants using ResearchMatch.org.

Measures

Demographic Information

Demographic information was collected from answers to questions regarding whether each participant was currently licensed as a physician in the United States, if

they were currently practicing, years of medical experience, age, sex, gender, race/ethnicity, years of practice, and medical specialty.

Support for Medical Marijuana Use

A binary (Yes/No) question was asked to determine whether participants would support MM to treat the following 23 health conditions:

- Amyotrophic lateral sclerosis
- Autism
- Cancer
- Crohn's disease
- Dyskinetic disorders
- Damage to the nervous tissue of the spinal cord with objective neurological indication of intractable spasticity
- Epilepsy
- Glaucoma
- HIV / AIDS
- Huntington's disease
- Inflammatory bowel disease
- Intractable seizures
- Multiple sclerosis
- Neurodegenerative disorders
- Neuropathies
- Opioid use disorder
- Parkinson's disease
- Post-traumatic stress disorder
- Severe chronic or intractable pain of neuropathic origin or severe chronic or intractable pain in which conventional therapeutic intervention and opiate therapy are contraindicated or ineffective
- Sickle cell anemia
- Terminal illness
- Anxiety
- Tourette's syndrome

For each medical condition, potential participants were asked the following question: "Would you support medical marijuana to treat this condition?" Responses to this binary variable were condensed to serve as the dependent variable for the study as follows: participants marked Y for "Yes" and N for "No" for each condition.

Perception of Empirical Evidence

The perceived strength of the existing evidence-based research for the use of MM was examined using a 5-point Likert-type scale. Specifically, the question asked, "Overall, how strong is the empirical evidence in support of MM to treat the approved conditions?" The Likert-type scale was as follows: 1- *very weak*, 2-*weak*, 3-*mixed*, 4-*strong*, 5-*very strong* for each medical condition.

Provider Attitudes and Beliefs Regarding Medical Cannabis in General

The Provider Attitudes and Beliefs Regarding Medical Cannabis in General survey is a measure composed of eight statements aimed at examining whether physicians view marijuana as a legitimate, effective, and safe form of treatment. It is an existing scale that had physicians rate the degree to which they either agreed or disagreed with each statement by using a 5-point Likert scale with scores of 1 and 2 being *strongly disagree* and *somewhat disagree*, respectively, a score of 3 being *neither agree nor disagree*, and scores of 4 and 5 being *somewhat agree* and *strongly agree*, respectively. For the purposes of this study, this scale was incorporated and used, but upon further review, only the first question from this scale was used in order to be able to quantify and generalize the results more accurately. The Likert Scale is a rating scale that is commonly used in questionnaires and surveys as a means of collecting data.

Statistical Analysis Plan

Descriptive statistics were used to characterize the sample and examine the distribution of the different variables.

Bivariate correlations were used to examine the relationship between participants' demographic characteristics, their support for recommending MM for

various medical conditions, their perceptions of empirical evidence for MM, and their attitudes toward MM. These analyses were conducted in order to identify any instances of multicollinearity and to identify demographic variables that were significantly correlated with the dependent variables, indicating they should be included in the regression models.

A linear regression was conducted to examine the degree to which perceptions of empirical evidence for MM (Hypothesis 1), and attitudes toward MM (Hypothesis 2) would predict likelihood of recommending MM for the various medical conditions. Demographic variables that were found to be correlated with the dependent variables were included in the regression model. In order to achieve this, a correlational matrix was implemented.

To use linear regression, assumptions that must be met include (a) a linear relationship between continuous predictors and the logit of the outcome variable, (b) independence of observed data points, and (c) multicollinearity (Field, 2013). For descriptive purposes, the proportion and number of physician participants who indicated that MM should be used for each condition were also analyzed and reported. A power analysis for a linear regression with three predictors was incorporated and estimated for a moderate effect size. This study used an alpha of .05, which indicated that a sample of approximately 107 would be required to achieve statistical power of .80.

Procedure

The student researcher went through the necessary procedural steps to gain IRB approval for the study. Once this was achieved, the student researcher programmed his dissertation survey into the REDCap program. The survey link generated by REDCap was posted to the private PCOM Alumni Facebook group page, and permission was obtained to post on other physician-focused Facebook pages and listservs. The study

recruited physician-level participants using ResearchMatch.org. Participants were informed of who was eligible to take part in the study (i.e., licensed physicians in the United States who were currently practicing) before they pressed the link to the survey. Additionally, the first few survey questions inquired about the previously listed inclusion criteria to determine eligibility. Potential participants who did not meet criteria were directed to a separate page that thanked them for their time and informed them that they were not eligible to continue the survey. Potential participants who did meet criteria were taken to the demographic section of the survey, which featured questions regarding years of medical experience, age, sex, and gender. Once this information was completed, participants then moved on to the second, third, and fourth sections of the survey. The second and third sections of the survey used a Likert scale to measure participants' levels of support for the use of MM to treat each of the 23 health conditions and to measure the amount of empirical evidence they believed existed to support marijuana's efficacy as a form of treatment for each health condition. The fourth section used an existing Likert scale to measure participants' attitudes toward recreational and medical use of cannabis. Once the survey was completed, each participant was directed to a different page that thanked them for their time, and the survey was then exported to SPSS for further statistical analysis.

CHAPTER 4: RESULTS

Participant Characteristics

The sample group ($n = 24$) consisted of 15 (62.5%) male and nine (37.5%) female physician participants with a mean age of 45.7 years ($SD = 13.45$). A total of 31 participants responded to the survey; however, seven participants were dropped because they did not complete the entire survey, including essential outcome variables related to evidence and attitudes. Of the sample, 83.4% identified themselves as Caucasian, 4.2% identified themselves as Black or African American, and 12.5% identified themselves as Asian or Asian American. Of the sample, 8.3% identified their ethnicity as Latinx/Hispanic, and 91.7% of the sample identified as non-Latinx/Hispanic. Of the total sample of 24 physician participants, 17 (70.8%) reported that they did not have a license to recommend medical marijuana (MM) as opposed to the 7 (29.2%) that reported they did (see Table 1).

Table 1*Demographics*

Variable	<i>M (SD)/N (%)</i>
Age	45.67 (13.45)
Biological sex	
Male	15 (62.5)
Female	9 (37.5)
Race	
Caucasian	20 (83.4)
Black or African American	1 (4.)
Asian or Asian American	3 (12.5)
Ethnicity	
Latinx/Hispanic	2 (8.3)
Non-Latinx/Hispanic	22 (91.7)
Certified to recommend medical marijuana	
Yes	7 (29.2%)
No	17 (70.8%)

In regard to medical specialty, the vast majority of the participants reported specializing in either neurology (33.3%) or psychiatry (25%), followed by internal medicine (16.7%), family medicine (8.3%), other (8.3%), general internal (4.2%), and anesthesiology (4.2%; see Table 2). From the total sample group ($n = 24$), the mean score for total years in practice was 15.65 ($SD = 15.34$; see Table 2).

Table 2*Medical Specialty*

Medical Specialty	<i>N (%) / M (SD)</i>
Family medicine	2 (8.3%)
General internal	1 (4.2%)
Neurology	8 (33.3%)
Anesthesiology	1 (4.2%)
Internal medicine	4 (16.7%)
Psychiatry	6 (25%)
Other	2 (8.3%)
Years of practice	15.65 (15.34)

The sample group provided some geographical diversity, notably from 12 different states in total. When asked the state each physician practiced in, the vast majority reported that they were practicing in New York (33.3%), Pennsylvania (16.7%), or New Jersey (12.5%). The rest of the sample practiced in nine other states (Arizona, Colorado, Illinois, Louisiana, North Dakota, Ohio, South Carolina, Texas, and Virginia), each of which consisted of 4.2% of the sample (see Table 3).

Table 3*State Practicing*

State practicing	<i>N</i> (%)
AZ	1 (4.2%)
CO	1 (4.2%)
IL	1 (4.2%)
LA	1 (4.2%)
NJ	3 (12.5%)
NY	8 (33.3%)
ND	1 (4.2%)
OH	1 (4.2%)
PA	4 (16.7%)
SC	1 (4.2%)
TX	1 (4.2%)
VA	1 (4.2%)

This study aimed to examine whether physicians' level of support for MM would be significantly and positively associated with their perceptions of the strength of its empirical evidence and their attitudes toward MM. This study also aimed to examine whether physicians' perceptions of evidence would be significantly and positively correlated with their attitudes. SPSS 24.0 was used to analyze the variables of interest.

Bivariate correlations were conducted to examine the associations between the dependent variable (i.e., physician's level of support for MM), the hypothesized

independent variables (i.e., perception of evidence, attitudes toward MM), and demographic variables (i.e., age, biological sex, race, ethnicity, years of practice, and certified to recommend; see Table 4). Significant inverse associations were identified between the dependent variable (i.e., support for MM) and the demographic variables: age ($R = -.43, p = .05$) and years of practice ($R = -.48, p = .05$). Because age and years of practice were so highly correlated ($R = .96, p = .01$), multicollinearity was indicated. As a result, only years of practice was included in the linear regression model along with the hypothesized independent variables (see Table 4).

Table 4*Correlational Matrix of Demographics, Independent Variables, and Dependent Variable*

Variable	Support for MM	Perceived evid MM	Attitude MM	Age	Gender	Race	Years Practicing	MM certified
Support for MM	1.00							
Perceived evid for MM	.53**	1.00						
Attitudes toward MM	.79**	.49*	1.00					
Age	-.43*	-.06	-.32	1.00				
Gender	-.02	-.06	-.15	-.01	1.00			
Race	-.13	-.16	-.14	-.28	-.12	1.00		
Years practicing	-.48*	-.15	-.44*	.96**	-.08	-.28	1.00	
MM certified	.24	.41	.35	.14	.07	-.31	.18	1.00

Note. ** $p < .01$
* $p < .05$

Hypothesis 1

It was hypothesized that physicians' level of support for MM will be significantly and positively associated with their perceptions of the strength of its empirical evidence. As discussed earlier, years of practice was found to be significantly correlated with level of support and, therefore, was entered into the regression model. The overall

regression model was found to be significant, controlling for years of practice and including attitudes, and perceived evidence was found to be significant, $F(3, 21) = 9.63$, $p = .001$. While the overall model was significant, the hypothesized independent variable (i.e., perceived evidence) was not ($p = .21$). The overall model explained approximately 62% of variance (r squared = .62), (see Tables 5, 6, and 7).

Table 5*Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.785 ^a	.616	.552	4.53990

a. Predictors: (Constant), Medical cannabis is a legitimate medical therapy. How long have you been a practicing physician (in years)? Mean evidence rating.

Table 6*Anova^a*

Model	Sum of squares	df	Mean square	F	Sig
Regression	595.372	3	198.457	9.629	.001 ^b
Residual	370.992	18	20.611		
Total	966.364	21			

a. Dependent Variable: Number of conditions supported.

b. Predictors: (Constant), Medical cannabis is a legitimate medical therapy. How long have you been a practicing physician (in years)? Mean evidence rating.

Table 7
Coefficients^a

Model	Unstandardized coefficients <i>B</i>	Unstandardized coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	-2.889	4.670		-.618	.544
Practicing physician (in years)?	-.080	.070	-.177	-1.136	.271
Mean evid rating.	1.734	1.325	.218	1.309	.207
MM is legit medical therapy.	3.796	1.155	.577	3.287	.004

a. Dependent Variable: Number of conditions supported.

Hypothesis 2

It was hypothesized that physicians' level of support for MM will be significantly and positively associated with their attitudes toward marijuana (medical or not). As previously discussed under Hypothesis 1, attitudes toward MM was included in the regression model along with years of practice and perceived evidence. The overall model was significant and accounted for 62% of the variance in level of support. Findings supported the hypothesis, indicating that attitudes were a significant predictor of level of support ($p = .004$).

Hypothesis 3

It was hypothesized that physicians' perceptions of evidence will be significantly and positively correlated with their attitudes toward MM. Results of the linear regression were statistically significant, $F(2, 21) = 4.25, p = .03$. The model explained approximately 31% of the variance (r squared = .309). The model coefficients indicated that perceived evidence was as significant predictor of level of physician attitudes ($B = .53, p = .036$), and years of practice fell below the level of statistical significance ($B = -.02, p = .154$). See tables 8, 9, and 10.

Table 8

Model Summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.556 ^a	.309	.236	.902

a. Predictors: (Constant), Mean evidence rating, How long have you been a practicing physician (in years)?

Table 9*Anova^a*

Model	Sum of squares	df	Mean square	F	Sig.
Regression	6.908	2	3.454	4.246	.030 ^b
Residual	15.455	19	.813		
Total	22.364	21			

a. Dependent Variable: Medical cannabis is a legitimate medical therapy.

b. Predictors: (Constant), Mean evidence rating, How long have you been a practicing physician (in years)?

Table 10*Coefficients^a*

Model	Unstandardized Coefficients <i>B</i>	Unstandardized Coefficients Std. error	Standardized coefficients beta	t	Sig.
(Constant)	2.605	.709		3.672	.002
Practicing physician (in years)?	-.020	.013	-.287	-1.486	.154
Mean evid rating	.527	.234	.435	2.256	.036

a. Dependent Variable: Medical cannabis is a legitimate medical therapy.

CHAPTER 5: DISCUSSION

This study examined three hypotheses. The first hypothesis was that physicians' level of support for medical marijuana (MM) would be significantly and positively associated with their perceptions of the strength of its empirical evidence. Although Hypothesis 1 was not supported, the overall linear regression was significant when combined with years of practice and physicians' attitudes, suggesting that with a greater sample size, the results may have differed and that an association may exist between physicians' perceptions of evidence, physicians' total years of experience, and perceptions of evidence. This study's second hypothesis was that physicians' level of support for MM would be significantly and positively associated with their attitudes toward marijuana (medical or not). The second hypothesis was supported, indicating that physicians who have a more positive interpretation of MM as an effective form of treatment would be more likely to recommend it and vice versa. This study's third and final hypothesis was that physicians' perceptions of evidence would be significantly and positively correlated with their attitudes toward MM. This hypothesis was supported, indicating that if physicians believe that they possess enough data and empirical support, they are more likely to develop a more concrete perspective on whether MM is effective as treatment.

The results from Hypothesis 1 do not seem to be supported by the limited literature that was found regarding this topic. According to a study conducted by Kondrad and Reid (2013), the vast majority of the sample of 486 physicians reported that their primary source of information on MM came from medical literature and personal experiences with patients, which were also the two highest rated factors that helped

determine whether they would recommend or not recommend MM to patients (decision to recommend = 331, decision not to recommend = 152). The results from this study contribute an alternative perspective within the literature on the associations between physicians' levels of support for MM and their perceptions of evidence regarding its efficacy. This also may present an opportunity for future studies to replicate this dimension of research to examine the consistency of the results between these two factors.

The results from Hypothesis 2 seem to be supported by the limited literature that was found regarding this topic. A study conducted by Lombardi et al. (2020) found that from a sample of 314 physicians, a statistically significant relationship existed between physicians' likelihood to recommend MM and their opinions that it should be legal and possessed medicinal uses. Physicians were twice as likely to recommend MM if they believed it should be legalized and believed that it was associated with positive health benefits. A study conducted by Charuvastra et al. (2005) found significant associations between physicians' attitudes and their level of support to recommend MM. The results from this study help reinforce and support existing literature that was found regarding this topic.

The results from Hypothesis 3 are consistent with the limited literature that exists on the topic. According to Lombardi et al. (2020), physicians who reported concern regarding lack of evidence of MM's efficacy as a form of treatment and who were worried about its psychoactive effects presented an inverse relationship to their likelihood to recommend MM to patients. In addition, a study conducted by Kansagara et al. (2020)

found that from a sample of 249 physicians, 90% reported that peer-reviewed literature influenced their attitudes toward MM.

This study did note, however, some physicians' gaps in knowledge, for example, 27% reported not possessing the awareness of current research surrounding potential benefits/harms of cannabis use, 58% were unfamiliar with the term "dabbing," and 40% did not believe cannabis could be addictive. The results from this study help reinforce and support existing literature found regarding this topic.

According to cognitive behavioral theory, the way in which individuals perceive a situation and/or topic tends to influence their reactions and behaviors rather than the situation itself. In relation to physicians and their perceptions of MM, some physicians may have biased and/or inaccurate conceptualizations of MM. Some physicians, for instance, may believe that MM exclusively possesses negative side effects, despite some evidence that indicates that MM may help individuals increase their appetites and improve sleep. Other physicians may exclusively focus on the benefits of MM while discounting or lacking knowledge of some of the potential drawbacks of MM. Cognitive-behavioral theory training opportunities may help medical students and future physicians develop a more concrete awareness of the pros and cons of MM, especially if it were to become part of their curriculum.

Some additional findings occurred after the bivariate correlations were conducted. Significant inverse associations were identified between independent variable (i.e., physician attitude toward MM) and the demographic variable, years of practice. This finding suggests that physicians who were more experienced possessed less supportive attitudes toward MM as an efficacious form of treatment. This was further supported by

the finding that the demographic feature of age possessed significant inverse associations with the dependent variable of physicians' level of support for MM, further reinforcing the idea that physicians who were older and more experienced possessed less supportive attitudes toward MM.

Implications

The results of this study point to a few primary implications. One of these implications is that physicians' perceptions of evidence impacted physicians' attitudes, yet did not impact physicians' levels of support for MM. Additionally, both physicians' age and years of practice were significantly correlated to one another and had an inverse correlation to physicians' attitudes. Another implication, also strongly supported by the literature, was that most physicians and healthcare providers agreed that the medical field could benefit from additional research on MM and that providing additional education and training opportunities on the empirical support for MM for various health conditions may be important. Findings from this study have provided an improved, but limited understanding of the factors that impact physicians' varying attitudes and support for MM. This may help to inform continued policy efforts related to MM and strategies to address physicians' knowledge and perceptions regarding its use. Findings have shed some light on physicians' likelihood of recommending MM for the different approved conditions and on their confidence in the strength of supporting research for the efficacy of MM for each condition.

Strengths

One of the strengths of this study was its focus on examining variable associations that have limited previous research and its moderate geographic diversity (i.e., participants from 12 different states). Additionally, although the small sample size of this study should be considered a limitation, one should note that despite this limitation, two of the three hypotheses were supported, an outcome quite uncommon among research studies with smaller sample sizes. Another strength of the study was its use of a self-report survey format, which was very cost effective, allowed results to be easily obtained, and could be completed more quickly compared to other approaches. Additionally, the two Likert scales implemented in measuring physicians' levels of support and perceptions of evidence for MM helped draw conclusions more clearly, based on whether variables met statistical significance or not.

Limitations

Some of the limitations in this study included a small sample size (nine of 12 states had only one participant), making generalizability of these results difficult. In addition to the small sample size, participants represented a wide variety of medical specialties, further diluting the sample. Another limitation of the study was that it used a self-report measure. Although such an approach was a quick and convenient way of gathering data, the potential drawback of such an approach was that participants may have provided responses that were socially acceptable rather than based on their genuine beliefs. Additionally, several participants did not complete the survey, another common drawback of implementing a self-report measure.

Another limitation of the study included the measurement scales themselves. The

Support for Medical Marijuana Use scale consisted of binary “Yes/No” response options, which severely limited participants’ abilities to elaborate on their responses. Furthermore, for the Perception of Empirical Evidence scale, which consisted of a 5-point-Likert scale, provided no option for participants who were uncertain or did not know the amount of evidence that existed in support of MM’s effectiveness to treat each medical condition. This may have been a contributing factor as to why some participants left some questions blank in this section and/or stopped doing the survey altogether. The Attitudes (Provider *Attitudes* and Beliefs Regarding Medical Cannabis in General) scale consisted of a one-item, 5-point Likert scale, which limited participants’ abilities to elaborate on their responses and/or to express their uncertainty, as this once again was not an option provided.

Future Directions

Based on the findings from this study, several future directions may be worth exploring. Future directions could include replicating this study with a larger sample, possibly providing more insight as to physicians’ similarities and differences from one another based on medical specialty and region of practice. Another possible direction for future research is to continue to examine the sources of information (e.g., media, literature, clients, other physicians’ views) physicians rely on most frequently to help them frame their clinical impressions regarding MM as an efficacious form of treatment. Future research may also examine how age and years of practice may be associated with attitudes toward MM, and whether this can be addressed with specialized training. Other future directions may include examining the similarities/differences among physicians who are licensed to recommend MM versus those who are not licensed and the

reasons/arguments they developed to support their clinical perspectives. Such research may also help re-contextualize state laws and any pending legislations regarding MM throughout the country and even in different regions of the world.

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APPENDIX**SURVEY**

Section 1:

Demographic Information

1. Age: ____
2. Sex: ____
3. Ethnicity: _____
4. Are you a currently licensed physician in the state of Pennsylvania? (Y/N).
5. Are you currently practicing? (Y/N).
6. How long have you been a practicing physician? _____
7. Are you certified to recommend medical marijuana? (Y/N).
8. What is your scope of practice?
9. What is your medical specialty? _____

Section 2:

Support for Use of Medical Marijuana

Please mark Y for "yes" or N for "no" regarding whether you would support medical marijuana as a form of treatment for each medical condition.

1. Amyotrophic Lateral Sclerosis
Would you support medical marijuana to treat this condition? (Y/N).
2. Autism
Would you support medical marijuana to treat this condition? (Y/N).
3. Cancer
Would you support medical marijuana to treat this condition? (Y/N).
4. Crohn's Disease
Would you support medical marijuana to treat this condition? (Y/N).
5. Dyskinetic Disorders
Would you support medical marijuana to treat this condition? (Y/N).
6. Damage to the nervous tissue of the spinal cord with objective neurological indication of intractable spasticity
Would you support medical marijuana to treat this condition? (Y/N).
7. Epilepsy
Would you support medical marijuana to treat this condition? (Y/N).

8. Glaucoma

Would you support medical marijuana to treat this condition? (Y/N).

9. HIV/AIDS

Would you support medical marijuana to treat this condition? (Y/N).

10. Huntington's Disease

Would you support medical marijuana to treat this condition? (Y/N).

11. Inflammatory Bowel Disease

Would you support medical marijuana to treat this condition? (Y/N).

12. Intractable Seizures

Would you support medical marijuana to treat this condition? (Y/N).

13. Multiple Sclerosis

Would you support medical marijuana to treat this condition? (Y/N).

14. Neurodegenerative Disorders

Would you support medical marijuana to treat this condition? (Y/N).

15. Neuropathies

Would you support medical marijuana to treat this condition? (Y/N).

16. Opioid Use Disorder

Would you support medical marijuana to treat this condition? (Y/N).

17. Parkinson's Disease

Would you support medical marijuana to treat this condition? (Y/N).

18. Post-traumatic Stress Disorder

Would you support medical marijuana to treat this condition? (Y/N).

19. Severe chronic or intractable pain of neuropathic origin or severe chronic or intractable pain in which conventional therapeutic intervention and opiate therapy is contraindicated or ineffective

Would you support medical marijuana to treat this condition? (Y/N).

20. Sickle Cell Anemia

Would you support medical marijuana to treat this condition? (Y/N).

21. Terminal Illness

Would you support medical marijuana to treat this condition? (Y/N).

22. Anxiety

Would you support medical marijuana to treat this condition? (Y/N).

23. Tourette's Syndrome

Would you support medical marijuana to treat this condition? (Y/N).

Section 3:

Perception of Empirical Evidence:

Overall, how strong is the empirical evidence in support of medical marijuana to treat the approved conditions?

1. Amyotrophic Lateral Sclerosis

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

2. Autism

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

3. Cancer

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

4. Crohn's Disease

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

5. Dyskinetic Disorders

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

6. Damage to the nervous tissue of the spinal cord with objective neurological indication of intractable spasticity

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

7. Epilepsy

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

8. Glaucoma

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

9. HIV/AIDS

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

10. Huntington's Disease

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

11. Inflammatory Bowel Disease

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

12. Intractable Seizures

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

13. Multiple Sclerosis

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

14. Neurodegenerative Disorders

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

15. Neuropathies

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

16. Opioid Use Disorder

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

17. Parkinson's Disease

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

18. Post-traumatic Stress Disorder

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

19. Severe chronic or intractable pain of neuropathic origin or severe chronic or intractable pain in which conventional therapeutic intervention and opiate therapy is contraindicated or ineffective

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

20. Sickle Cell Anemia

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

21. Terminal Illness

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

22. Anxiety

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

23. Tourette's Syndrome

1-Very weak 2-Weak 3-Mixed 4-Strong 5-Very Strong

Section 4:

Attitudes Toward Medical Marijuana

Provider Attitudes and Beliefs Regarding Medical Cannabis in General

1. Medical cannabis is a legitimate medical therapy.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

2. Medical providers should be offering medical cannabis for managing medical conditions.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

3. Medical cannabis has significant interactions with medical therapies.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

4. Medical cannabis can effectively treat symptoms associated with medical conditions.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

5. The process to certify patients in the medical cannabis program prevents me from enrolling patients.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

6. I am aware that patients use cannabis illegally to treat symptoms or medical conditions.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

7. Medical cannabis through the United States is safer than cannabis that patients use illegally.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree

8. Medical cannabis through the United States is more effective than cannabis that patients use illegally.

1-Strongly disagree
2-Somewhat Disagree
3-Neither Agree nor Disagree
4-Somewhat Agree
5-Strongly Agree